

NATIONAL GEOGRAPHIC



CHANGE OF HEARTLAND

AMERICA'S GREAT PLAINS

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A young North Dakotan revels in his farm life outside the town of Medina.

BY JIM RICHARDSON

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ON THE WEBSITE

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SIGHTS & SOUNDS Experience the Great Plains in transition.

MULTIMEDIA David McLain describes life on an expedition.

FORUM Air your opinions in our online forum.

POSTCARDS AND WALLPAPER Select photos from this issue.

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OnScreen & Online

National Geographic Channel



SUNDAY, MAY 9, 8 P.M. ET/PT

Born Wild

From a 200-pound baby elephant to a thumb-size alligator, wild creatures are born with a fierce instinct to live. Watch as young animals learn to hunt, hide, and survive—sometimes with human help. In California biologists help condor chicks take wing, and in Namibia's Etosha National Park a naturalist couple raise their child amid families of lions and baboons.

WEDNESDAYS, 9 P.M. ET/PT

Mysteries of the Deep

Fabled shipwrecks, heroic rescues (right), spectacular discoveries—see all these and more as you join in great sea adventures. Take an eerie tour of lost luxury in *Secrets of the Titanic*, search for the fishing boat that was lost in the “perfect storm” in *Sea Hunters: Andrea Gail*, and probe the seas for submarines, treasure, and other deeply held secrets.



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WEDNESDAYS
10 P.M. ET/PT

Riddles & Rituals

Why was Stonehenge built? Who raised Easter Island's giant statues? This weekly series investigates these and other perplexing mysteries.

Channel and NGT&F programming information accurate at press time; consult local listings or the Society's website at nationalgeographic.com

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A WORLD IN TRANSITION

SIGHTS & SOUNDS Experience 30 years in the life of Cuba, Kansas, with photographer Jim Richardson. ■ **WALLPAPER** Decorate your desktop with the Great Plains (right). nationalgeographic.com/magazine/0405

PATHWAYS TO ACHIEVEMENT

“PEOPLE CAN BUILD THEIR WILLPOWER,” says Børge Ousland. On our new site the Arctic explorer shares his expedition-tested tactics for tackling the challenges of everyday life. ■ **WIN A SAFARI** to southern Africa. Details at nationalgeographic.com/pathways



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Madagascar Fish Eagle (*Haliaeetus vociferoides*)

Size: Length, 70-80 cm **Weight:** 2.0-3.5 kg

Habitat: Lakes, rivers, mangroves and coastal islands of western Madagascar

Surviving number: Estimated at 200-250



Photographed by Laszlo Novak

WILDLIFE AS CANON SEES IT

Meet a fish's worst nightmare. The Madagascar fish eagle ranges over sheltered bays and deep open sea alike, snatching prey so adroitly from the surface that it hardly gets its feet wet. This ultimate angler is also known to pirate catches from less intimidating birds. It guards its own territory jealously, perching in high places to survey its domain. Yet ongoing studies reveal that it can be less possessive when it comes to mates:

some subpopulations engage in male-female, males-female and male-females breeding strategies. Despite these uncommon measures, it is still imperiled, as is much of Madagascar's wildlife, by human disturbance.

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From the Editor

Most of the pictures you see in NATIONAL GEOGRAPHIC were taken by photographers who were working far from home. Very far. We send photographers around the world to cover subjects that are sometimes as foreign to them as they are to you.

But there are exceptions. Veteran photographer Jim Richardson, who spent his childhood on a farm in rural Kansas—that's him with a friend, below—shot two stories in this issue: a look at Amer-



RALPH RICHARDSON

ica's Great Plains (page 2) and an intimate portrait of Cuba, Kansas (page 30), a small town only 15 miles east of his boyhood home. Jim's been shooting in Cuba for three decades, recording with a sensitive eye the lives of its citizens as they've grown up, had kids, and then grandkids. To the people of Cuba, he's as much a fixture as the town water tower.

Jim has photographed more than 20 stories for us, from Scotland's Orkney Islands to the Colorado River. He admits there are advantages to working in unfamiliar territory. "It's almost always easier going somewhere that's exotic to you," he says. "Everything's fresh, and you can see pictures everywhere."

"On the other hand," he notes, "when you're covering the exotic, you're often only seeing the surface. It takes time and experience to see beyond what looks superficially interesting and recognize the subtle things that define communities. Kansas and the Plains have rich stories to tell, but their stories need time to unfold."

So settle in and let Jim show you his corner of the world. Think of it as a family album, a lifetime in the making.

Bill Allen

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There's a **different** way to treat seasonal allergies.

SINGULAIR IS THE ONLY SEASONAL ALLERGY MEDICATION THAT SPECIFICALLY BLOCKS LEUKOTRIENES. Many existing allergy medicines block histamine. SINGULAIR is different. It works by blocking leukotrienes (loo-koh-TRY-eens). Leukotrienes are an underlying cause of allergy symptoms. They are substances produced in your body that can make you feel uncomfortable during allergy season.

HELPS RELIEVE A BROAD RANGE OF SYMPTOMS. A single SINGULAIR tablet a day helps relieve a broad range of seasonal allergy symptoms for a full 24 hours. SINGULAIR is also available in a cherry chewable tablet for children 2 to 14 years of age. In clinical studies, SINGULAIR was not associated with drowsiness. SINGULAIR should be taken once a day, as prescribed. SINGULAIR is available by prescription only.

IMPORTANT INFORMATION: In clinical studies, side effects were usually mild and varied by age, and included headache, ear infection, sore throat, and upper respiratory infection. Side effects generally did not stop patients from taking SINGULAIR. SINGULAIR should not be taken by people who are sensitive to any of its ingredients.

Ask your doctor about SINGULAIR for your seasonal allergies.
Call 1-888-MERCK-95, or visit singulair.com.

Please see the Patient Product Information on the adjacent page and discuss it with your doctor.



This product is available through the Merck Patient Assistance Program. To find out if you qualify call 1-888-MERCK-56.

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A different way to treat seasonal allergies.

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Patient Information
SINGULAIR® (SING-u-lair) Tablets, Chewable Tablets, and Oral Granules
Generic name: montelukast (mon-te-LOO-kast) sodium

9094216

Read this information before you start taking SINGULAIR®. Also, read the leaflet you get each time you refill SINGULAIR, since there may be new information in the leaflet since the last time you saw it. This leaflet does not take the place of talking with your doctor about your medical condition and/or your treatment.

What is SINGULAIR®?

- SINGULAIR is a medicine called a leukotriene receptor antagonist. It works by blocking substances in the body called leukotrienes. Blocking leukotrienes improves asthma and seasonal allergic rhinitis (also known as hay fever). SINGULAIR is not a steroid.

SINGULAIR is prescribed for the treatment of asthma and seasonal allergic rhinitis:

1. Asthma.

SINGULAIR should be used for the long-term management of asthma in adults and children ages 12 months and older.

Do not take SINGULAIR for the immediate relief of an asthma attack. If you get an asthma attack, you should follow the instructions your doctor gave you for treating asthma attacks. (See the end of this leaflet for more information about asthma.)

2. Seasonal Allergic Rhinitis.

SINGULAIR is used to help control the symptoms of seasonal allergic rhinitis (sneezing, stuffy nose, runny nose, itching of the nose) in adults and children ages 2 years and older. (See the end of this leaflet for more information about seasonal allergic rhinitis.)

Who should not take SINGULAIR?

Do not take SINGULAIR if you are allergic to SINGULAIR or any of its ingredients.

The active ingredient in SINGULAIR is montelukast sodium.

See the end of this leaflet for a list of all the ingredients in SINGULAIR.

What should I tell my doctor before I start taking SINGULAIR?

Tell your doctor about:

- **Pregnancy:** If you are pregnant or plan to become pregnant, SINGULAIR may not be right for you.
- **Breast-feeding:** If you are breast-feeding, SINGULAIR may be passed in your milk to your baby. You should consult your doctor before taking SINGULAIR if you are breast-feeding or intend to breast-feed.
- **Medical Problems or Allergies:** Talk about any medical problems or allergies you have now or had in the past.
- **Other Medicines:** Tell your doctor about all the medicines you take, including prescription and non-prescription medicines, and herbal supplements. Some medicines may affect how SINGULAIR works, or SINGULAIR may affect how your other medicines work.

How should I take SINGULAIR?

For adults or children 12 months of age and older with asthma:

- Take SINGULAIR once a day in the evening.
- Take SINGULAIR every day for as long as your doctor prescribes it, even if you have no asthma symptoms.
- You may take SINGULAIR with food or without food.
- If your asthma symptoms get worse, or if you need to increase the use of your inhaled rescue medicine for asthma attacks, call your doctor right away.
- **Do not take SINGULAIR for the immediate relief of an asthma attack.** If you get an asthma attack, you should follow the instructions your doctor gave you for treating asthma attacks.
- Always have your inhaled rescue medicine for asthma attacks with you.
- Do not stop taking or lower the dose of your other asthma medicines unless your doctor tells you to.
- If your doctor has prescribed a medicine for you to use before exercise, keep using that medicine unless your doctor tells you not to.

For adults and children 2 years of age and older with seasonal allergic rhinitis:

- Take SINGULAIR once a day, at about the same time each day.

- Take SINGULAIR every day for as long as your doctor prescribes it.
- You may take SINGULAIR with food or without food.

How should I give SINGULAIR oral granules to my child?

Do not open the packet until ready to use.

SINGULAIR 4-mg oral granules can be given either:

- directly in the mouth; OR
- mixed with a spoonful of one of the following soft foods at cold or room temperature: applesauce, mashed carrots, rice, or ice cream. Be sure that the entire dose is mixed with the food and that the child is given the entire spoonful of the mixture right away (within 15 minutes).

IMPORTANT: Never store any oral granule/food mixture for use at a later time. Throw away any unused portion.

Do not put SINGULAIR oral granules in liquid drink. However, your child may drink liquids after swallowing the SINGULAIR oral granules.

What is the daily dose of SINGULAIR for asthma or seasonal allergic rhinitis?

For Asthma (Take in the evening):

- One 10-mg tablet for adults and adolescents 15 years of age and older,
- One 5-mg chewable tablet for children 6 to 14 years of age,
- One 4-mg chewable tablet or one packet of 4-mg oral granules for children 2 to 5 years of age, or
- One packet of 4-mg oral granules for children 12 to 23 months of age.

For Seasonal Allergic Rhinitis (Take at about the same time each day):

- One 10-mg tablet for adults and adolescents 15 years of age and older,
- One 5-mg chewable tablet for children 6 to 14 years of age, or
- One 4-mg chewable tablet or one packet of 4-mg oral granules for children 2 to 5 years of age.

What should I avoid while taking SINGULAIR?

If you have asthma and if your asthma is made worse by aspirin, continue to avoid aspirin or other medicines called non-steroidal anti-inflammatory drugs while taking SINGULAIR.

What are the possible side effects of SINGULAIR?

The side effects of SINGULAIR are usually mild, and generally did not cause patients to stop taking their medicine. The side effects in patients treated with SINGULAIR were similar in type and frequency to side effects in patients who were given a placebo (a pill containing no medicine).

The most common side effects with SINGULAIR include:

- stomach pain
- stomach or intestinal upset
- heartburn
- tiredness
- fever
- stuffy nose
- cough
- flu
- upper respiratory infection
- dizziness
- headache
- rash

Less common side effects that have happened with SINGULAIR include (listed alphabetically): agitation including aggressive behavior, allergic reactions (including swelling of the face, lips, tongue, and/or throat, which may cause trouble breathing or swallowing), hives, and itching, bad/vivid dreams, increased bleeding tendency, bruising, diarrhea, hallucinations (seeing things that are not there), hepatitis, indigestion, inflammation of the pancreas, irritability, joint pain, muscle aches and muscle cramps, nausea, palpitations, pins and needles/numbness, restlessness, seizures (convulsions or fits), swelling, trouble sleeping, and vomiting.

Rarely, asthmatic patients taking SINGULAIR have experienced a condition that includes certain symptoms

that do not go away or that get worse. These occur usually, but not always, in patients who were taking steroid pills by mouth for asthma and those steroids were being slowly lowered or stopped. Although SINGULAIR has not been shown to cause this condition, **you must tell your doctor right away if you get one or more of these symptoms:**

- a feeling of pins and needles or numbness of arms or legs
- a flu-like illness
- rash
- severe inflammation (pain and swelling) of the sinuses (sinusitis)

These are not all the possible side effects of SINGULAIR. For more information ask your doctor or pharmacist.

Talk to your doctor if you think you have side effects from taking SINGULAIR.

General Information about the safe and effective use of SINGULAIR

Medicines are sometimes prescribed for conditions that are not mentioned in patient information leaflets. Do not use SINGULAIR for a condition for which it was not prescribed. Do not give SINGULAIR to other people even if they have the same symptoms you have. It may harm them. **Keep SINGULAIR and all medicines out of the reach of children.**

Store SINGULAIR at 25°C (77°F). Protect from moisture and light. Store in original package.

This leaflet summarizes information about SINGULAIR. If you would like more information, talk to your doctor. You can ask your pharmacist or doctor for information about SINGULAIR that is written for health professionals.

What are the ingredients in SINGULAIR?

Active ingredient: montelukast sodium

SINGULAIR chewable tablets contain aspartame, a source of phenylalanine. Phenylketonurics: SINGULAIR 4-mg and 5-mg chewable tablets contain 0.674 and 0.842 mg phenylalanine, respectively.

Inactive ingredients:

- **4-mg oral granules:** mannitol, hydroxypropyl cellulose, and magnesium stearate.
- **4-mg and 5-mg chewable tablets:** mannitol, microcrystalline cellulose, hydroxypropyl cellulose, red ferric oxide, croscarmellose sodium, cherry flavor, aspartame, and magnesium stearate.
- **10-mg tablet:** microcrystalline cellulose, lactose monohydrate, croscarmellose sodium, hydroxypropyl cellulose, magnesium stearate, hydroxypropyl methylcellulose, titanium dioxide, red ferric oxide, yellow ferric oxide, and carnauba wax.

What is asthma?

Asthma is a continuing (chronic) inflammation of the bronchial passageways which are the tubes that carry air from outside the body to the lungs.

Symptoms of asthma include:

- coughing
- wheezing
- chest tightness
- shortness of breath

What is seasonal allergic rhinitis?

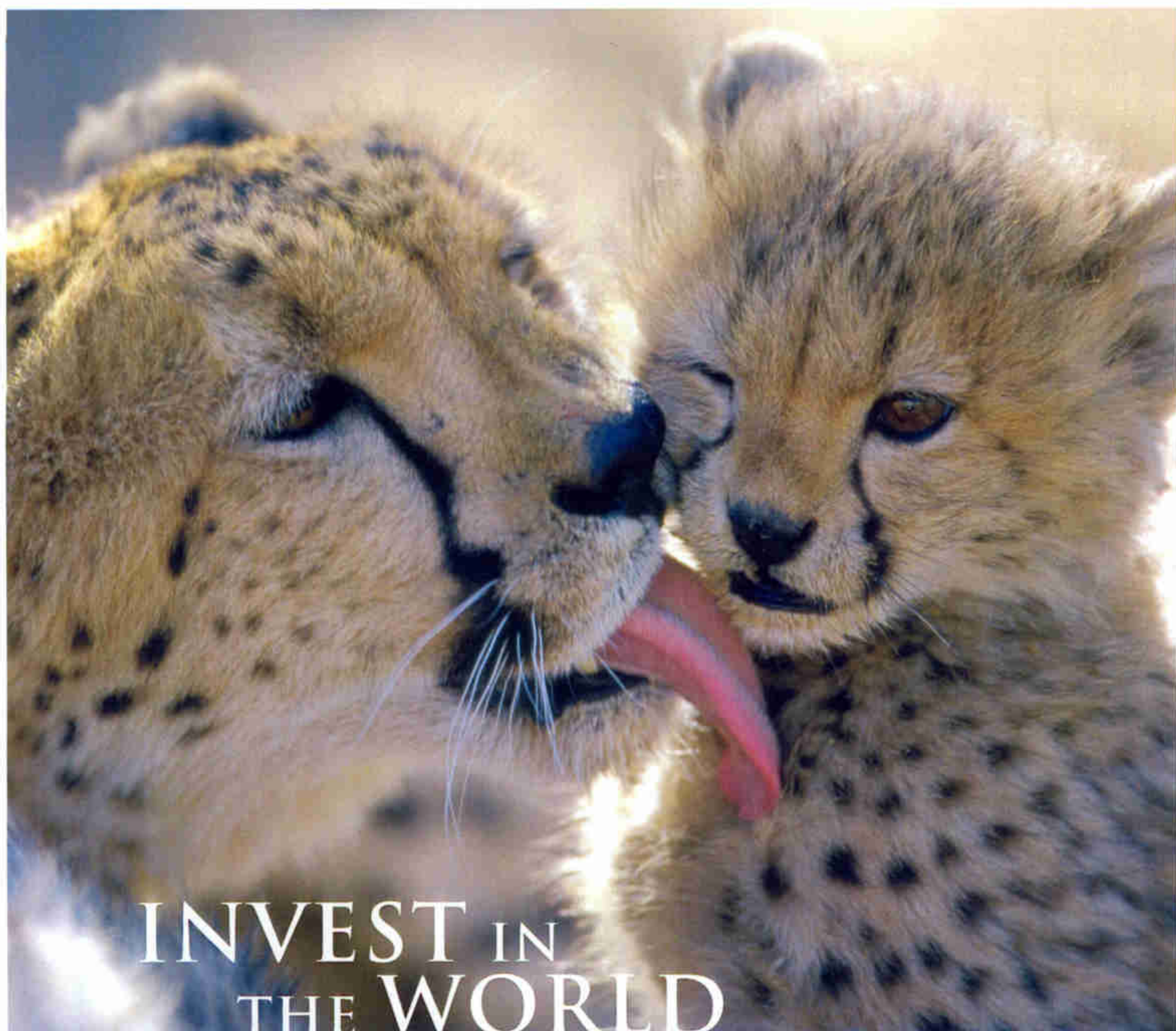
- Seasonal allergic rhinitis, also known as hay fever, is an allergic response caused by pollens from trees, grasses and weeds.
- Symptoms of seasonal allergic rhinitis may include:
 - stuffy, runny, and/or itchy nose
 - sneezing

Rx only

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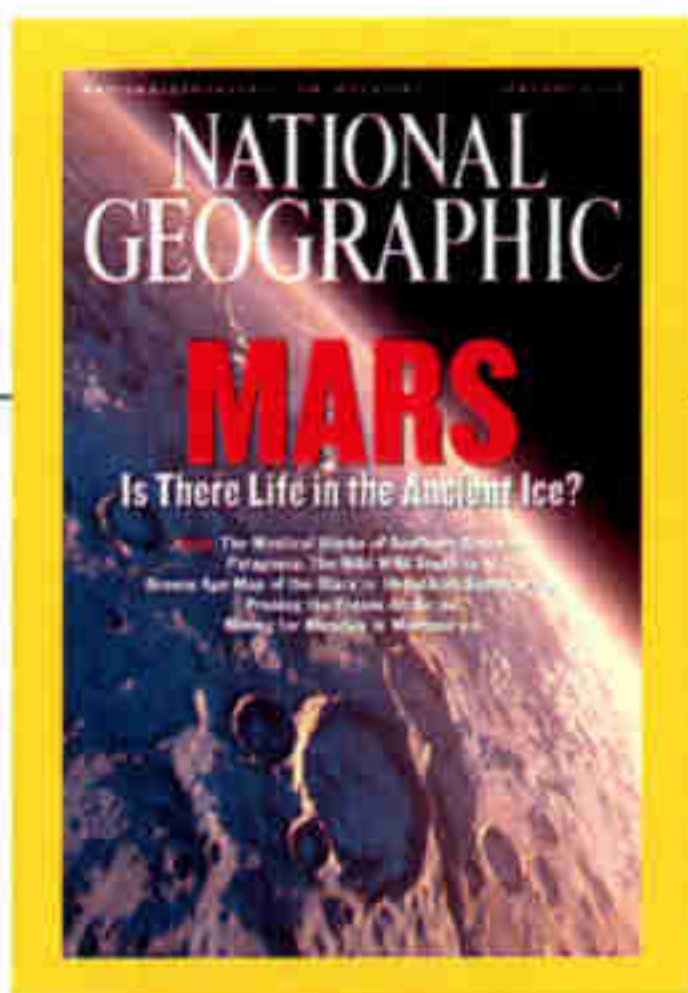
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Forum

January 2004

The Mars story elicited the greatest response this month. As is often the case when we publish images of celestial phenomena, readers tell us that they see things out there. Mickey Mouse was spotted on the cover, and Homer Simpson's head was seen in a picture of Mars on page 31. In the December 2003 article on the Hubble Space Telescope, readers saw a woman's face and even the profile of Jesus in a nebula.



Mars

Your article on the exploration of Mars was entertaining, but you left out one very important fact: At what cost to us? At a time when we have senior citizens who can't afford proper nutrition because they need their Social Security check to buy the drugs they need to stay alive, how can NASA be justified? It squanders our hard-earned tax dollars on frivolous curiosity that has no return on our investment.

LANCE DAVIS
Chandler Heights, Arizona

I am so glad that President Bush is planning for more visits to the moon and a visit to Mars. It is important that we expand into space and set up not only space stations but also bases. Many things have slowed the space program, such as the shuttle tragedies, but we must always

strive forward. It's about time the space program received a jump start. Not since President Kennedy has our future looked so bright.

PAUL DALE ROBERTS
Elk Grove, California

The billions of dollars spent to learn if life existed on Mars should be spent on saving Earth's animals and plants that are on the brink of extinction. Besides, if life is found on other planets, it would inevitably be imperiled due to our all too human proclivity to destroy.

BRIEN COMERFORD
Glenview, Illinois

The Mars piece was great, but you used only metric units of measure. Living in the United States, I don't get to work with the metric system that often. To give your great illustrations more meaning, could you include standard measurements in parentheses?

LEW AARONSON
Culver City, California

Thank you for using metric measurements throughout the article. I only wish that you would extend this practice throughout your publication.

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Geographica: The Barrier

Any sovereign nation has not only the right but also the duty to defend its citizens from murderous attacks by its neighbors. The fence being built by Israel is designed to protect population centers from the ravages of the intifada. If this means some inconvenience for a small number of Palestinians, so be it. The United States would do the same to protect its citizens.

NELSON MARANS
Silver Spring, Maryland

Few Americans would tolerate the continual harassment that I have observed Palestinians suffering in their own land. We would like for Israelis to live in peace within the Green Line,



ED KASHI

but they will never have peace until Israel treats Palestinians as human beings and brother Semites.

WESLEY M. WILSON
Olympia, Washington

Your pictures were very politically slanted: a small Palestinian child, the minuscule anti-sniper section of the fence, and two armed Israeli soldiers. Think about it. Maybe next time you could show the remains of an Israeli child after

a homicide attack or Palestinian patients (who crossed into Israel legally and with peaceful intentions) being treated in Jerusalem hospitals.

BRUCE AVISHAI
Arad, Israel

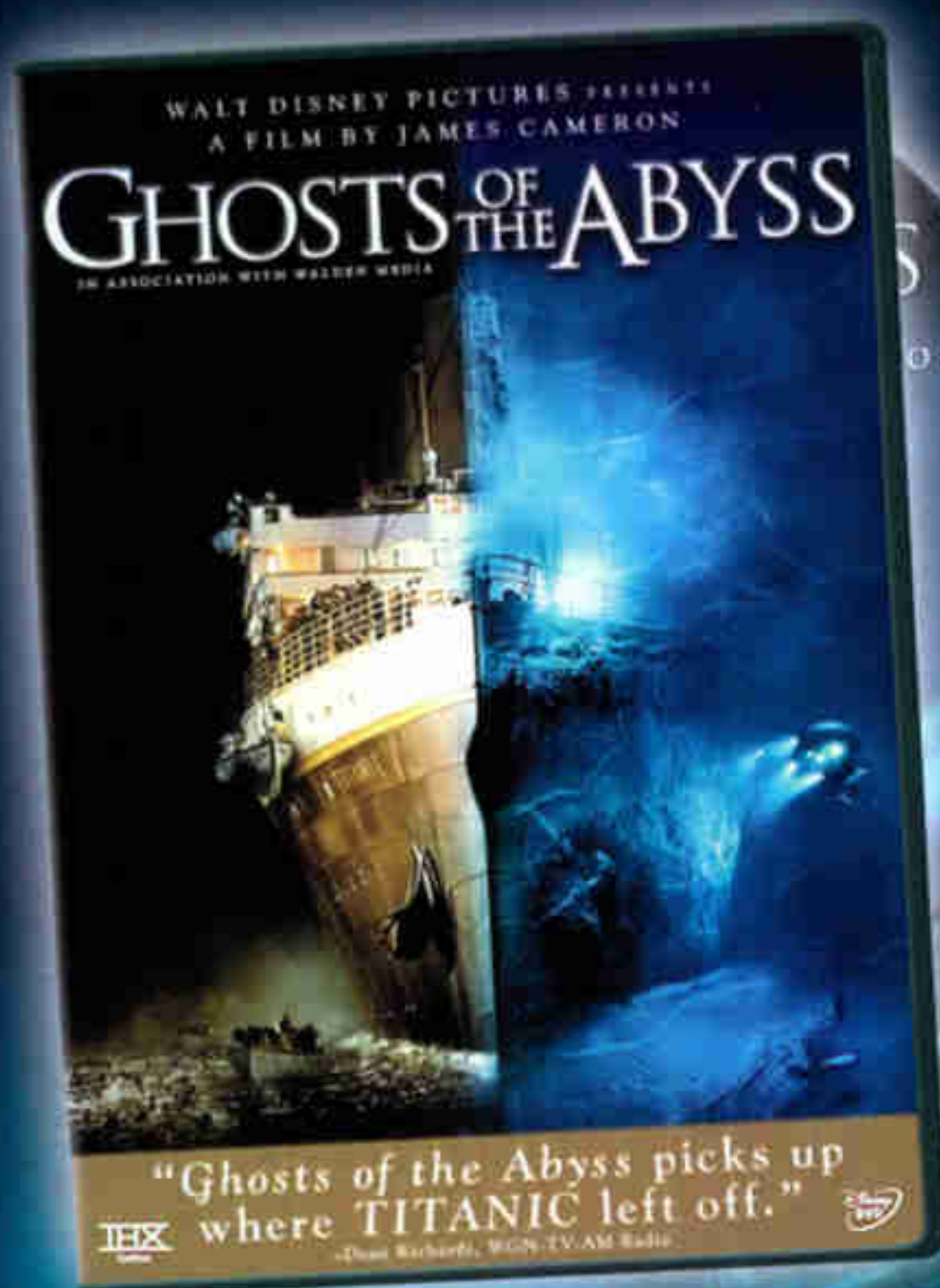
You mentioned that suicide bombers were responsible for the wall and cited the percentage of Israelis who were in favor of its construction. Did you not think it might be pertinent to mention that the Israelis occupy someone else's land? And that maybe you should have cited the percentage of Palestinians who might be against this occupation of their country?

RICHARD HOAR
Burton upon Trent, Staffordshire

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Disney

You could do so much good if you helped lead the way to what will inevitably be widespread use of the metric system in the U.S.

HARRY WYETH
Grass Valley, California

In 1976, following on the heels of the Metric Conversion Act of 1975, we began a gradual change to metric—beginning with scientific articles and supplement maps. But after a tidal wave of complaints from readers, we adopted a compromise approach: We now use U.S. equivalents,

WRITE TO FORUM National

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except in select science and natural history stories.

ZipUSA: Basin, Montana

I worry that the article's carefree tone might lull your readers into a false sense that radon might actually be good for you. The so-called therapeutic effects of exposure to ionizing radiation from radon, such as in old mines converted to health spas, have never been demonstrated in reputable scientific studies. In 1999 the National Academy of Sciences published a comprehensive assessment of the scientific data on radon and concluded that exposure to even low concentrations in indoor environments poses significant health risks. The Environmental Protection Agency estimates that radon is responsible for about 20,000 deaths from lung cancer

annually. Whatever the folktales touting health benefits from visits to radioactive mines, people should appreciate that even short excursions to places with high-level radon can increase a person's lifetime risk of cancer, if only marginally. But the greater concern for public health is that a person can receive a dangerous dose just from breathing low levels of radon in familiar spaces over many years. For that reason, EPA recommends that all Americans test their indoor air for radon at home. Readers wanting to know more about managing health risk from radon can find useful information at epa.gov/radon.

THOMAS KELLY
Director

Indoor Environments Division
Environmental Protection Agency
Washington, D.C.



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In Iowa we think of elevated radon levels, such as I have in my home, as a public health hazard. Having read "Mining for Miracles," I am rethinking my anxiety over this condition. Perhaps I should see the entrepreneurial opportunity and begin inviting folks to share my home—for a price!

DONNA KALAR
Council Bluffs, Iowa

Patagonia

Your article captured the true essence of a land that is both wonderful and cruel. Although born in Buenos Aires, I was raised in Patagonia. My mother hated the ever present howling wind, yet I enjoyed living in one of the world's last frontiers. I remember telling some of my schoolmates who could not afford to travel to other parts of Argentina that in Buenos Aires there were trees taller than a man. They would not believe me. Anything that tall would be flattened in no time by the Patagonian winds. My congratulations to Simon Worrall and Peter Essick for a wonderful description of a land few people learn to love.

HORACIO A. MENDEZ
San Jose, California

Behind the Scenes

The photo of Leila the lion with the Crittercam around her neck still has me shaken and disappointed. If this camera had been placed around the neck of a human, as collars have been placed on slaves through the millennia, would you still say she "seems to be oblivious to the strange necklace"?

NEONE RUHMANN
Sacramento, California

Greg Marshall shares your concern for the welfare of Leila and

other animals; that's why he invented the Crittercam. "It's virtually impossible to protect and conserve a wild species without understanding its basic behavior and ecology: what it eats, where it socializes, how it communicates," he says. "Crittercam enables us to discover and study these

At a time when we have senior citizens who can't afford proper nutrition because they need their Social Security check to buy the drugs they need to stay alive, how can NASA be justified?

things." One or two of the hundreds of animals Greg and his colleagues have worked with reacted to the presence of the Crittercam and tried to remove it. Leila, who is familiar with radio collars, seemed unfazed by the 3.3-pound camera around her neck.

Star Search

I'm writing with a suggestion about the interpretation of the cluster of stars in the upper center of the sky disk. The author speculates that this cluster may represent the Pleiades. The star cluster only slightly suggests the Pleiades, so I would like to suggest that the central star in the cluster is Polaris and that the stars surrounding it are an asterism that is easy to see in any dark, rural sky.

STEVE IRVINE
Warton, Ontario

You're not the only one who sent in an interpretation of the sky disk. One reader suggested that the thin crescent depicted on the disk is actually the aurora borealis, while another speculated that the holes along the perimeter of the sky disk are evidence that it was an early surveying instrument.

This find must have incredible significance for European history, but sadly, since the objects in the cache were removed from their archaeological context, we may have lost a tremendous amount of information. I hope the significance of this loss was not overshadowed by the cloak-and-dagger aspects of the disk's acquisition.

GEORGE TWADDLE
Granger, Indiana

Flashback

The caption in Flashback incorrectly describes the photo as showing Corning Glass Works' first attempt at casting the 20-ton, 200-inch-diameter Palomar Observatory mirror. During the first casting attempt some of the silica firebrick cores, used to give the piece its honeycomb shape, broke loose. Therefore, some of the honeycomb openings in the flawed first casting were filled in. The mirror casting shown in your story has no filled-in honeycomb openings and is a picture of the second, successful casting.

GARY A. LOEB
West Grove, Pennsylvania

You're right. We regret the error.

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21	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	52	25.99	20.39	41.34	30.41	77.44	55.56	136.50	103.25
22	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	53	28.00	21.61	45.28	32.59	85.31	59.94	152.25	112.00
23	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	54	29.84	22.75	49.00	34.78	92.75	64.31	168.88	119.88
24	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	55	32.29	24.24	53.81	37.63	102.38	70.00	189.00	131.25
25	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	56	34.91	25.64	59.06	40.25	112.88	75.25	209.13	141.75
26	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	57	38.41	27.91	65.84	44.19	126.44	83.13	236.25	156.63
27	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	58	41.91	30.10	73.06	47.69	140.88	90.13	263.38	171.50
28	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	59	45.41	32.20	80.06	51.41	154.88	97.56	290.50	186.38
29	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	60	49.79	34.83	88.81	56.22	172.38	107.19	324.63	204.75
30	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	61	53.99	37.36	96.91	60.59	188.56	115.94	355.25	221.38
31	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	62	59.50	40.69	108.06	66.50	210.88	127.75	396.38	243.25
32	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	63	65.01	44.01	119.00	72.19	232.75	139.13	437.50	266.00
33	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	64	70.53	47.34	129.94	78.09	254.63	150.94	477.75	287.88
34	11.46	10.76	12.25	11.38	19.25	17.50	33.25	29.75	65	77.44	51.63	143.72	85.53	282.19	165.81	529.38	315.88
35	11.64	10.85	12.47	11.38	19.69	17.50	34.13	29.75	66	85.14	55.30	158.81	91.44	312.38	177.63	588.88	337.75
36	11.81	11.11	12.91	11.59	20.56	17.94	35.00	30.63	67	95.46	58.98	179.16	99.53	353.06	193.81	668.50	367.50
37	12.16	11.29	13.56	12.03	21.88	18.81	37.63	32.38	68	105.79	63.79	199.72	107.41	394.19	209.56	748.13	396.38
38	12.34	11.46	14.00	12.47	22.75	19.69	40.25	34.13	69	116.11	68.43	220.06	115.50	434.88	225.75	828.63	426.13
39	12.69	11.73	14.66	12.91	24.06	20.56	42.88	35.88	70	128.98	73.85	245.44	125.56	485.63	245.88	929.25	463.75
40	12.95	11.90	15.31	13.56	25.38	21.88	45.50	38.50	71	147.79	87.59	283.50	152.69	561.75	300.13	1063.13	572.25
41	13.56	12.43	16.84	14.44	28.44	23.63	49.88	42.00	72	172.81	106.14	334.03	188.78	662.81	372.31	1254.75	710.50
42	14.44	13.04	18.16	15.75	31.06	26.25	56.88	47.25	73	197.84	124.69	384.78	224.88	764.31	444.50	1447.25	848.75
43	15.14	13.74	19.69	17.06	34.13	28.88	63.00	51.63	74	222.86	143.15	435.31	261.19	865.38	517.13	1639.75	987.88
44	16.01	14.35	21.66	18.38	38.06	31.50	69.13	56.88	75	254.19	166.25	498.75	306.25	992.25	607.25	1880.38	1160.25
45	17.06	15.05	23.84	19.91	42.44	34.56	77.88	63.00	76	282.89	187.25	556.72	347.38	1108.19	689.50	2100.00	1318.63
46	17.94	15.49	25.59	20.78	45.94	36.31	82.25	66.50	77	321.21	215.34	634.16	402.06	1263.06	798.88	2420.25	1528.63
47	18.99	16.19	27.56	22.09	49.88	38.94	89.25	71.75	78	359.54	243.43	711.38	456.97	1417.50	908.69	2744.88	1757.88
48	20.13	16.89	29.97	23.41	54.69	41.56	93.63	77.00	79	397.86	271.60	788.81	511.88	1572.38	1018.50	3076.50	1990.63
49	21.26	17.59	32.16	24.72	59.06	44.19	99.75	81.38	80	442.84	301.44	885.72	580.56	1766.19	1155.88	3491.25	2282.88
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ARMED FORCES

Foreign Service

Soldiers waging war and keeping peace

The 20th century saw military conflagrations and official brutalities of unprecedented scope. Yet in the midst of that violence an idea took hold: that soldiers could be deployed for peace as well as war. Now, as a new century opens, more than half a million land-based troops are serving outside their home countries—some 160,000 as soldiers of war, the rest charged with building relationships with allies, assisting in disaster relief, patrolling borders. Like pieces on a global chessboard, peacekeeping soldiers have been positioned by governments and organizations that hope the presence and preparedness of these troops will defuse tension and build security.

"We are guests and as such we must respect the German way of life and culture," a manual instructs new arrivals to British

Forces Germany. The U.K.'s largest military contingent outside its own borders, the 22,000 troops stationed there are accompanied by an equal number of civilians and family members. The whole operation extends over an area of northwestern Germany nearly as large as Scotland. As with other foreign troops posted to Germany, the British force is a holdover from the Cold War.

Of course, war—the old-fashioned kind where nations unleash military force against one another—still prevails in many parts of the world. In Iraq the Polish soldiers pictured below in Karbala in October

Military Might

Worldwide, 47 countries have troops serving under their own flags deployed abroad—sometimes as welcome guests, sometimes not.

United States

Almost 370,000—more than a quarter of the country's 1.4 million active-service troops—are stationed abroad, with 120,000 in Iraq and 11,000 in Afghanistan.



The U.S., U.K., France, and the Netherlands have a combined total of more than 100,000 troops in Germany. Bases in Western Europe may shrink as troops are relocated to the east for rapid deployment to the Middle East and Central Asia.

Of eight South American countries contributing to UN missions in 2003, only Uruguay supplied more than a thousand troops. Since UN peacekeeping operations began in 1948, 62 citizens from 13 Central and South American nations have died in the service of peace.



KARIM SAHIB, AFP/GETTY IMAGES

A P H I C A

C R E A T U R E S O F O U R U N I V E R S E



United Kingdom

Some 38,000, almost one-fifth of the U.K.'s 200,000 active-duty troops, serve abroad. The largest contingents: 22,000 in Germany and 9,000 in Iraq.



Russia

Of Russia's nearly one million active-duty troops, about 18,000 serve abroad, almost all in former Soviet republics.



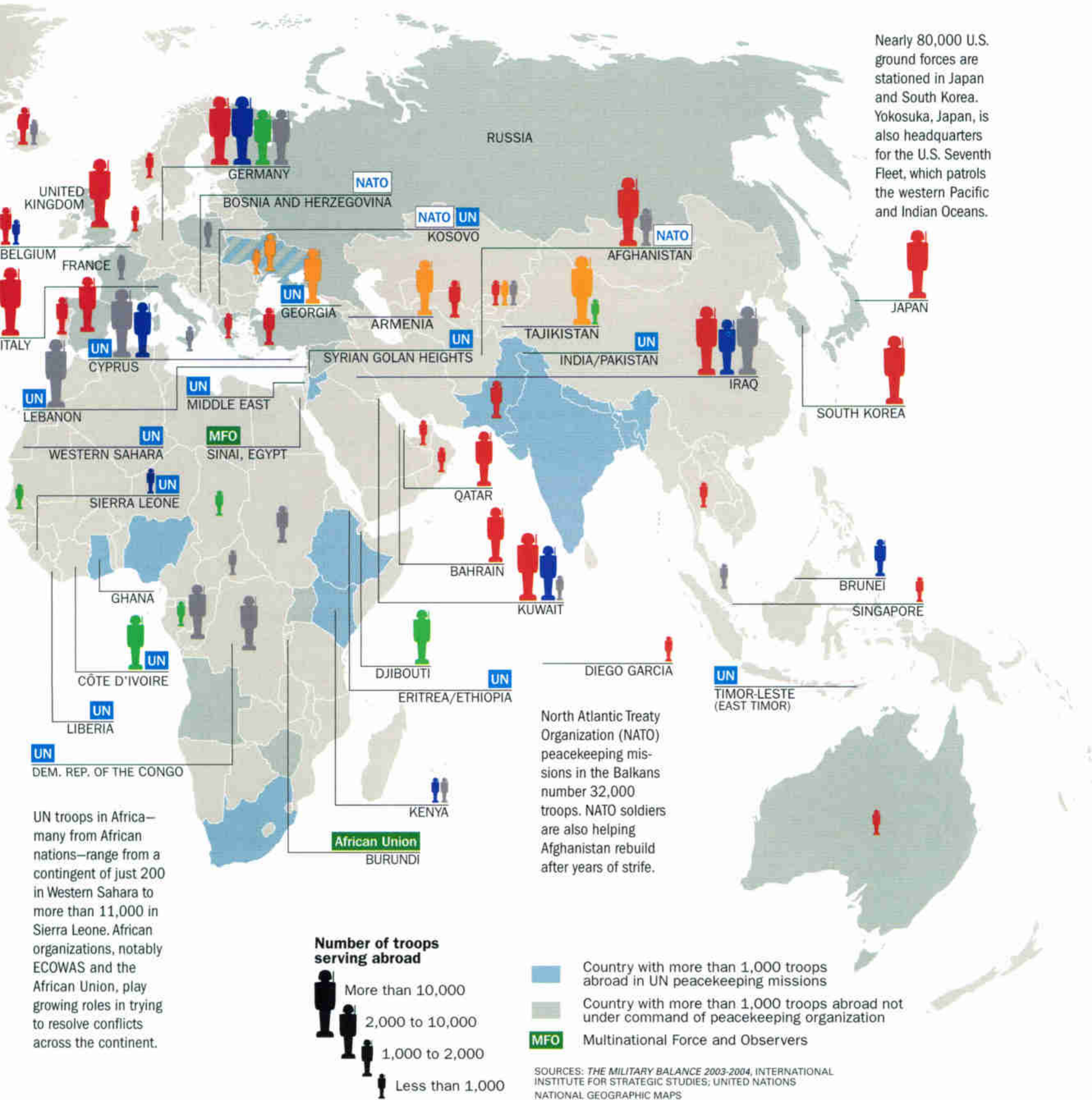
France

Of France's quarter million troops, about 12,000, or 5 percent, serve abroad, most in former French colonies in Africa.



All Others

Forty-three other nations have a total of 83,000 forces outside their own borders. About 16,000 troops from 34 countries are deployed with U.S. and U.K. forces in Iraq.



Nearly 80,000 U.S. ground forces are stationed in Japan and South Korea. Yokosuka, Japan, is also headquarters for the U.S. Seventh Fleet, which patrols the western Pacific and Indian Oceans.

North Atlantic Treaty Organization (NATO) peacekeeping missions in the Balkans number 32,000 troops. NATO soldiers are also helping Afghanistan rebuild after years of strife.

UN troops in Africa—many from African nations—range from a contingent of just 200 in Western Sahara to more than 11,000 in Sierra Leone. African organizations, notably ECOWAS and the African Union, play growing roles in trying to resolve conflicts across the continent.



AFP/CORBIS

2003 were serving with troops from various nations. As of February, the U.S., U.K., and 34 other coalition countries had 145,000 troops in Iraq. Conflicts in other parts of the Middle East, Africa, and Asia also bring soldiers into sometimes unexpected military coalitions—and unprecedented peacekeeping roles.

The United Nations' first peacekeeping mission was to the Middle East in 1948. Assigned to supervise a cease-fire between Arabs and Israelis, 63 military observers from the U.S., Belgium, and France were under the direction of a Swedish diplomat. In December 2003 more than 3,000 soldiers were engaged in a variety of multinational peacekeeping operations in the Middle East. Two-thirds were UN troops supervising the withdrawal of

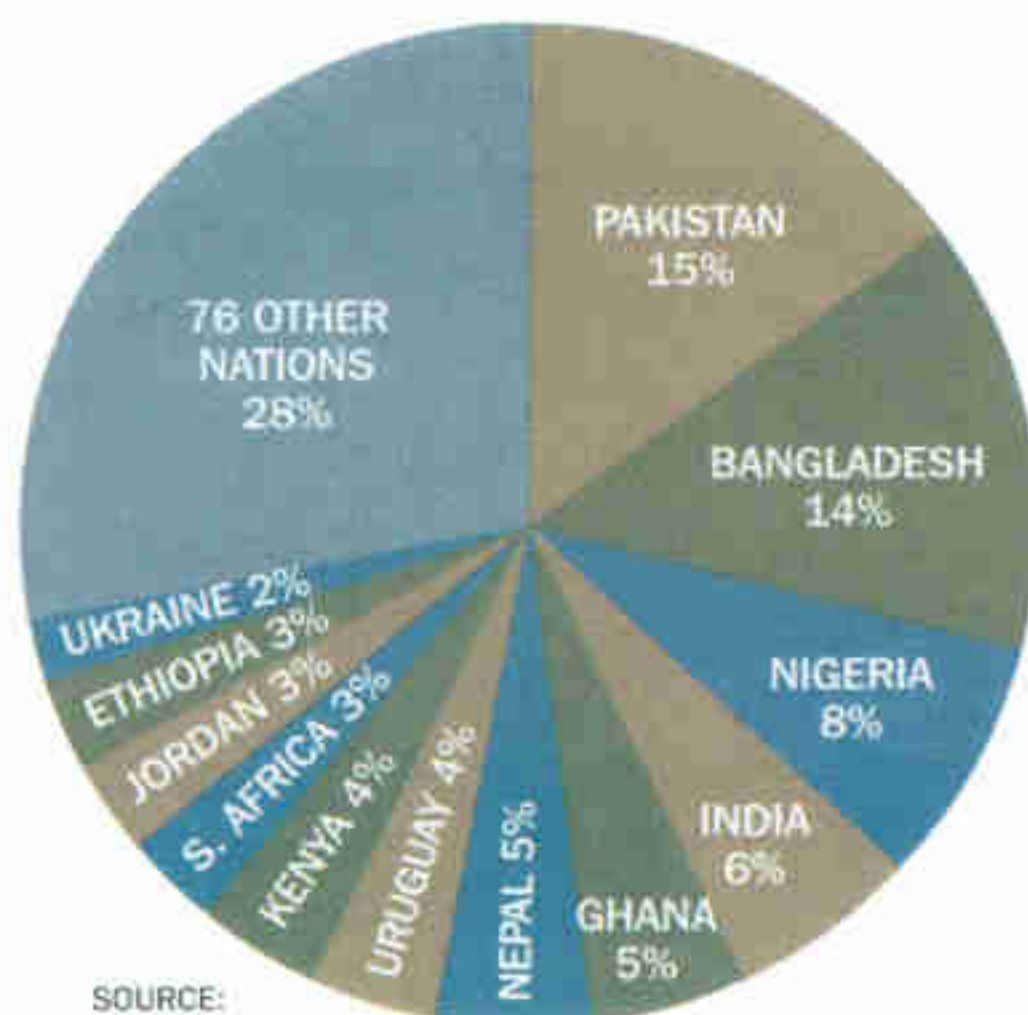
Israeli forces from neighboring Lebanon (above).

The UN's peacekeeping missions are authorized by the Security Council. Historically, personnel have been requested from member nations for UN-directed operations. Increasingly, though, the UN is calling on multinational organizations, like NATO, to carry out Security Council mandates. Globally, more than 85,000 troops are involved in UN peacekeeping missions as well as other operations authorized but not directed by the UN.

Recently, the leading contributors of military personnel to UN missions (graph below) have been developing nations. The UN pays contributing countries a thousand dollars per soldier per month—an economic incentive for some nations. Ghana's 2,200 UN peacekeepers, about a third of the country's armed forces, earned 26 million dollars in 2003, a sum almost equal to the government's defense budget. For larger troop contributors, like Pakistan and Bangladesh, UN payments add up to a negligible fraction of total defense spending. Today's soldier—seasoned by complex and hazardous duties abroad, carried out alongside comrades from around the world—is part of the changing face of peace, and war.

—Lynne Warren

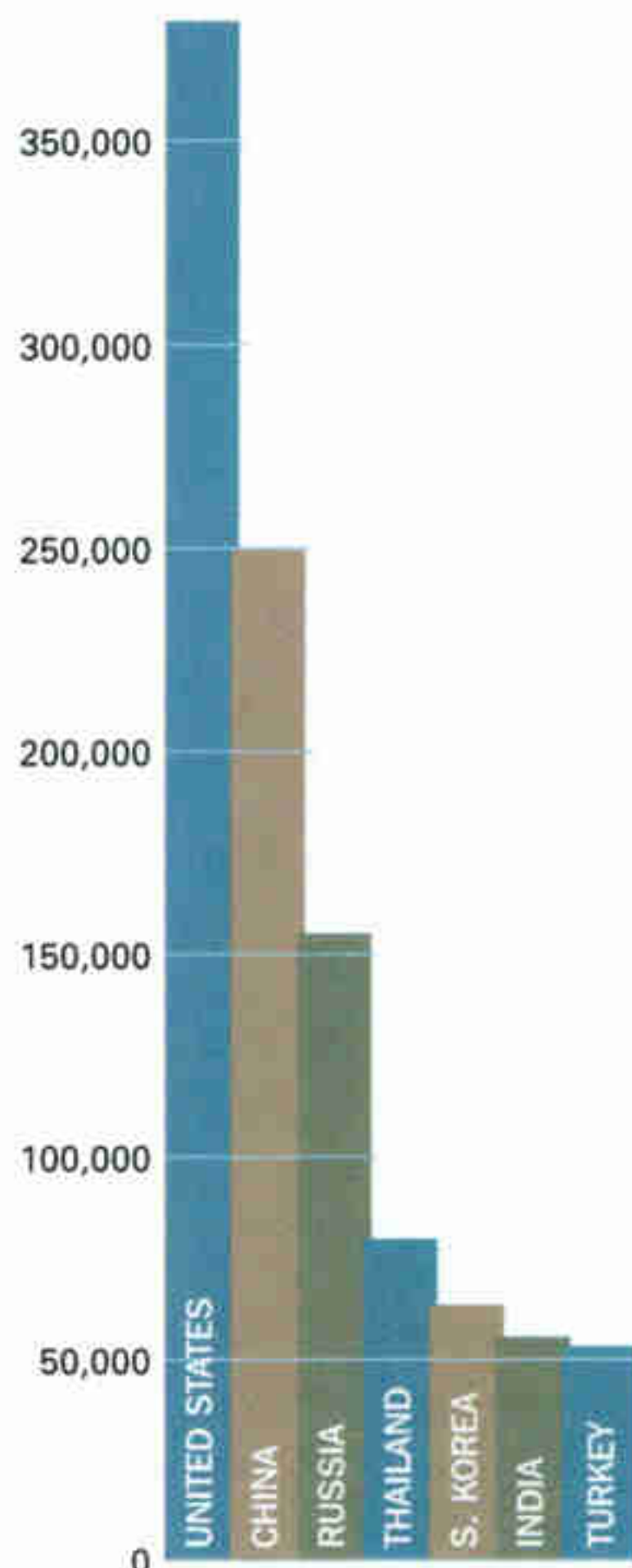
Countries Contributing to UN Peacekeeping Missions Total troops and military observers as of Jan. 2004: 44,000



SOURCE:
UNITED NATIONS

Assigned to the Seas

Largest Navies (personnel)



Experts typically measure naval power in terms of ships—aircraft carriers, submarines, cruisers, and their like. But even the most powerful vessel relies on its crew to make it work.

The U.S. Navy sails the globe. Its fleets in the Pacific and Atlantic also send forces to the Indian Ocean, the Persian Gulf and Red Sea, and the Mediterranean. Other navies concentrate their resources. Russia deploys over half of its vaunted submarine fleet in the Arctic and North Atlantic, while China emphasizes coastal defense. South Korea keeps a close eye on North Korean vessels, and Turkey focuses on patrolling its shipping lanes in the Black Sea and the Bosphorus.

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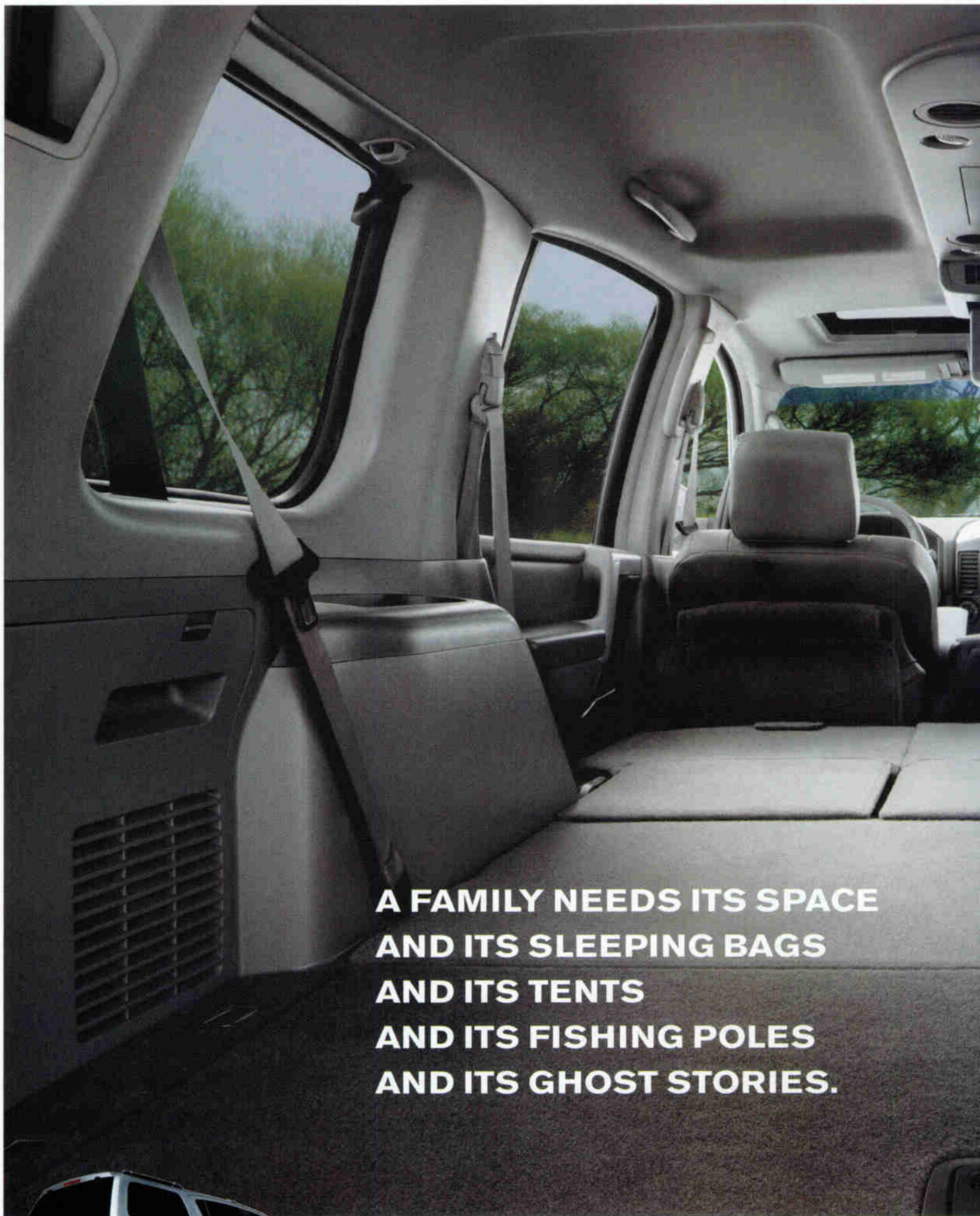
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NGS PHOTOGRAPHER MARK THIESSEN (ABOVE)

MONEY

Decoding the Euro

Easing Europe's historic burdens, by design

This month ten more nations join not only the European Union (see story page 54) but one of Europe's ongoing debates: How to create a unified vision for a continent whose past is fractured by centuries of war and bloodshed.

One way, at least symbolically, could be through the euro, common currency for most EU countries since 2002 and the money new members may eventually adopt. In 1996 a contest for euro banknote designs was announced, with instructions to participants to avoid the parochialisms of the old moneys—Cézanne on the French franc, the Brothers Grimm on the German mark, Marconi on the Italian lira. The new bills should “embody a cultural and political message that is readily acceptable to all European citizens.”

The 44 design entries ranged from algae and newts to abstract art. The winner, Robert Kalina of Austria, created seven euro

denominations. Their images of windows, portals, and bridges reflect seven European ages and styles, from classical to modern. Kalina's drawings were inspired by actual places, but he mixed architectural details from various locations in the final designs. What matters, he says, is the period and the feelings of connection that he hopes his images evoke.

Euro coins still feature a national icon on one side—like a Celtic harp for Ireland—but Kalina's banknotes deliver the marquee message: Our future will not be handcuffed by history's divisive details. Philosopher George Santayana said those who can't remember the past are condemned to repeat it. But the euro's generic portrait of history is trying to avoid remembering too much, and in the process conjuring old nationalist demons that, especially now with the EU's expansion, many Europeans hope to exorcise.

—Alan Mairson



Solidarity The circle of stars on the EU's flag—and on every euro—stands for perfection and completion, not specific nations.



Symbolism Archways and windows represent what lies ahead, explains Robert Kalina, the designer. “If I'd used portraits of anonymous people, they'd have lacked symbolism.”



Iconography Which bridges inspired Kalina's artful span on the 50 euro? He never said: Naming the bridges might stir up the national passions the bills are intended to overcome.



Security To stymie counterfeiters, the bills include features like holograms, watermarks, and fibers visible only under ultraviolet light.

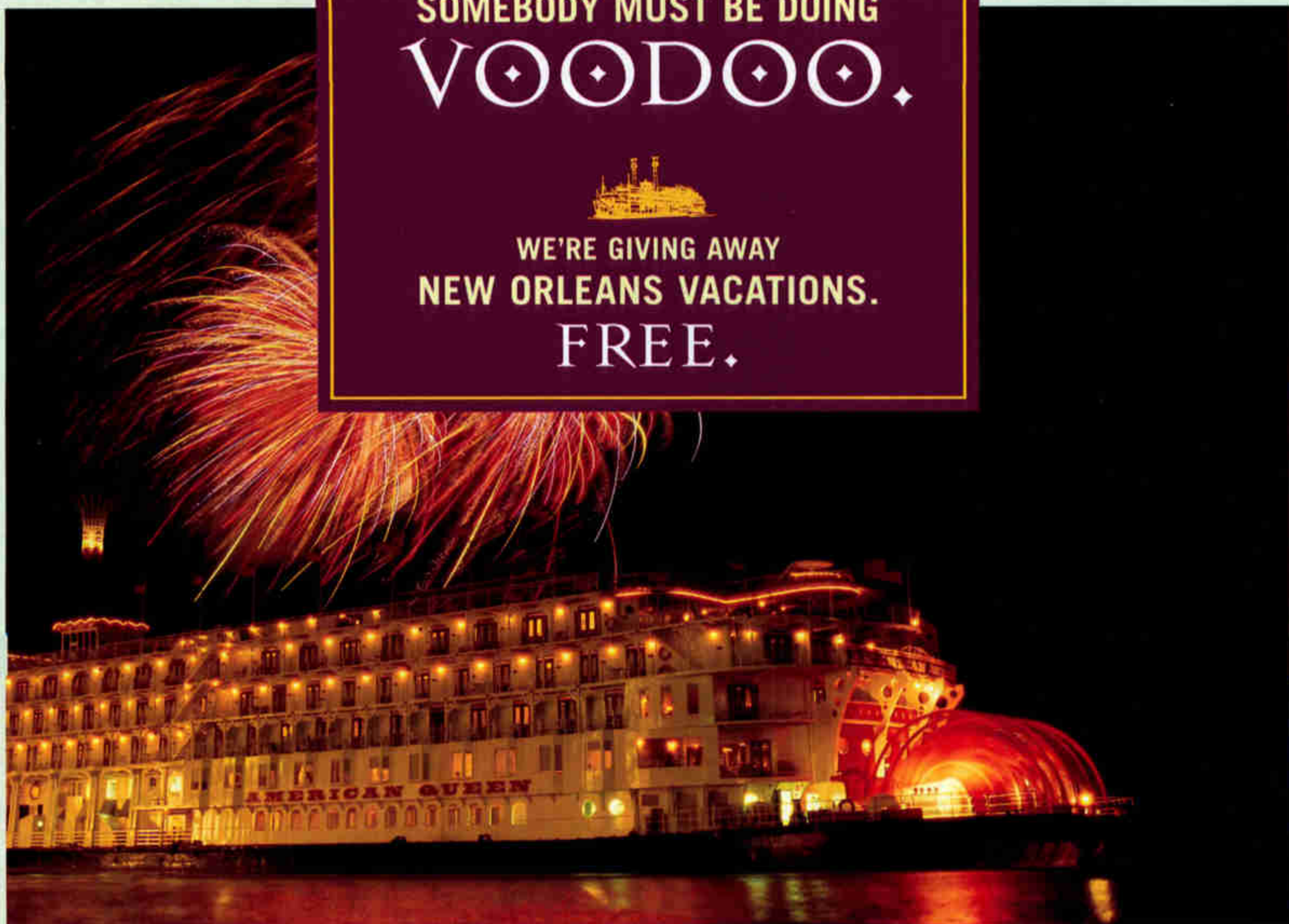


Unity Political borders evaporated on the bills and are fading elsewhere in the EU, which is trying to draft its first constitution.

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My Seven



Looking for Life in All the Wrong Places

Karl Stetter Microbiologist

Some environments are inhospitable, others just plain deadly. Those are the places where Karl Stetter of the University of Regensburg in Germany looks for "extremophiles," microbes that thrive where no other life-forms survive. Extremophiles may provide scientists with a model for life on other planets. Here's Stetter's list of Earth's nastiest extremophile habitats.

1 Deep-sea hydrothermal vents
The hottest environment known to sustain life. Seawater penetrates into Earth's crust at mid-ocean ridges, heats up, then emerges from mineral chimneys called black smokers. Archaea, primitive unicellular microbes likely similar to the earliest life-forms on Earth, thrive here at up to 250°F.

2 Antarctica's Dry Valleys No places on Earth are as dry and cold (it can drop down to minus 85°F here—even Mars gets warmer than that). Yet layers of photosynthetic microorganisms have been found inside translucent rocks.

3 Ocean trenches In the deep sea, life must overcome cold and crushing pressure. A Japanese submersible recovered barophilic (pressure-loving) microbes from the



LUCAS J. GILMAN (TOP); CARSTEN PETER

Mariana Trench, nearly 36,000 feet deep in the Pacific Ocean.

4 Salt lakes Halophilic (salt-loving) archaea somehow thrive in Great Salt Lake and the Dead Sea, where salt concentrations reach more than 2.5 pounds a gallon.

5 Boiling springs On Russia's Kamchatka Peninsula (above),

microbes live in springs that aren't just hot—some waters are as acidic as battery acid, some alkaline, others spiked with arsenic.

6 Deep underground Hyperthermophilic, or extreme-heat-loving, microbes have been found in geothermally heated oil reservoirs around 10,000 feet below Alaska's North Slope and the bed of the North Sea.

7 Radioactive waste sites Powerful DNA repair mechanisms permit the bacterium *Kineococcus radiotolerans* to tolerate hundreds of times the amount of radiation a human can survive.

WEBSITE EXCLUSIVE

Learn more about the strange organisms that live near hydrothermal vents in the Atlantic Ocean at nationalgeographic.com/magazine/0302/feature5.

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– Mike Ditka, NFL Hall of Fame player and coach

* Among orally administered ED treatments.

† Individual results may vary.

Please see adjacent Patient Information for more about LEVITRA (2.5 mg, 5 mg, 10 mg, and 20 mg) tablets.

LEVITRA is a medicine that may be used up to once a day to treat erectile dysfunction (ED). LEVITRA is for use by prescription only. Men taking nitrate drugs, often used to control chest pain (also known as angina), should not take LEVITRA. Men who use alpha-blockers, sometimes prescribed for high blood pressure or prostate problems, also should not take LEVITRA. Such combinations could cause blood pressure to drop to an unsafe level. The most commonly reported side effects are headache, flushing, and stuffy or runny nose. Men who experience an erection for more than four hours should seek immediate medical attention. You should not take LEVITRA if your doctor determines that sexual activity poses a health risk for you. LEVITRA does not protect against sexually transmitted diseases.



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Patient Information

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8/03

Read the Patient Information about LEVITRA before you start taking it and again each time you get a refill. There may be new information. You may also find it helpful to share this information with your partner. This leaflet does not take the place of talking with your doctor. You and your doctor should talk about LEVITRA when you start taking it and at regular checkups. If you do not understand the information, or have questions, talk with your doctor or pharmacist.

WHAT IMPORTANT INFORMATION SHOULD YOU KNOW ABOUT LEVITRA?

LEVITRA can cause your blood pressure to drop suddenly to an unsafe level if it is taken with certain other medicines. With a sudden drop in blood pressure, you could get dizzy, faint, or have a heart attack or stroke.

Do not take LEVITRA if you:

- **take any medicines called “nitrates.”**
- **use recreational drugs called “poppers” like amyl nitrate and butyl nitrate.**
- **take medicines called alpha-blockers.**

(See “Who Should Not Take LEVITRA?”)

Tell all your healthcare providers that you take LEVITRA. If you need emergency medical care for a heart problem, it will be important for your healthcare provider to know when you last took LEVITRA.

WHAT IS LEVITRA?

LEVITRA is a prescription medicine taken by mouth for the treatment of erectile dysfunction (ED) in men.

ED is a condition where the penis does not harden and expand when a man is sexually excited, or when he cannot keep an erection. A man who has trouble getting or keeping an erection should see his doctor for help if the condition bothers him. LEVITRA may help a man with ED get and keep an erection when he is sexually excited.

LEVITRA does not:

- cure ED
- increase a man’s sexual desire
- protect a man or his partner from sexually transmitted diseases, including HIV. Speak to your doctor about ways to guard against sexually transmitted diseases.
- serve as a male form of birth control

LEVITRA is only for men with ED. LEVITRA is not for women or children. LEVITRA must be used only under a doctor’s care.

HOW DOES LEVITRA WORK?

When a man is sexually stimulated, his body’s normal physical response is to increase blood flow to his penis. This results in an erection. LEVITRA helps increase blood flow to the penis and may help men with ED get and keep an erection satisfactory for sexual activity. Once a man has completed sexual activity, blood flow to his penis decreases, and his erection goes away.

WHO CAN TAKE LEVITRA?

Talk to your doctor to decide if LEVITRA is right for you.

LEVITRA has been shown to be effective in men over the age of 18 years who have erectile dysfunction, including men with diabetes or who have undergone prostatectomy.

WHO SHOULD NOT TAKE LEVITRA?

Do not take LEVITRA if you:

- **take any medicines called “nitrates”** (See “What important information should you know about LEVITRA?”). Nitrates are commonly used to treat angina. Angina is a symptom of heart disease and can cause pain in your chest, jaw, or down your arm. Medicines called nitrates include nitroglycerin that is found in tablets, sprays, ointments, pastes, or patches. Nitrates can also be found in other medicines such as isosorbide dinitrate or isosorbide mononitrate. Some recreational drugs called “poppers” also contain nitrates, such as amyl nitrate and butyl nitrate. Do not use LEVITRA if you are using these drugs. Ask your doctor or pharmacist if you are not sure if any of your medicines are nitrates.
- **take medicines called “alpha-blockers.”** Alpha-blockers are sometimes prescribed for prostate problems or high blood pressure. If LEVITRA is taken with alpha-blockers, your blood pressure could suddenly drop to an unsafe level. You could get dizzy and faint.
- **you have been told by your healthcare provider to not have sexual activity because of health problems.** Sexual activity can put an extra strain on your heart, especially if your heart is already weak from a heart attack or heart disease.
- **are allergic to LEVITRA or any of its ingredients.** The active ingredient in LEVITRA is called vardenafil. See the end of this leaflet for a complete list of ingredients.

WHAT SHOULD YOU DISCUSS WITH YOUR DOCTOR BEFORE TAKING LEVITRA?

Before taking LEVITRA, tell your doctor about all your medical problems, including if you:

- **have heart problems** such as angina, heart failure, irregular heartbeats, or have had a heart attack. Ask your doctor if it is safe for you to have sexual activity.
- **have low blood pressure** or have high blood pressure that is not controlled
- **have had a stroke**
- **or any family members have a rare heart condition known as prolongation of the QT interval (long QT syndrome)**
- **have liver problems**
- **have kidney problems and require dialysis**
- **have retinitis pigmentosa**, a rare genetic (runs in families) eye disease
- **have stomach ulcers**
- **have a bleeding problem**
- **have a deformed penis shape** or Peyronie’s disease
- **have had an erection that lasted more than 4 hours**
- **have blood cell problems** such as sickle cell anemia, multiple myeloma, or leukemia

CAN OTHER MEDICATIONS AFFECT LEVITRA?

Tell your doctor about all the medicines you take including prescription and non-prescription medicines, vitamins, and herbal supplements. LEVITRA and other medicines may affect each other. Always check with your doctor before starting or stopping any medicines. Especially tell your doctor if you take any of the following:

- medicines called nitrates (See “What important information should you know about LEVITRA?”)
- medicines called alpha-blockers. These include Hytrin® (terazosin HCl), Flomax® (tamsulosin HCl), Cardura® (doxazosin mesylate), Minipress® (prazosin HCl) or Uroxatral® (alfuzosin HCl).
- medicines that treat abnormal heartbeat. These include quinidine, procainamide, amiodarone and sotalol.
- ritonavir (Norvir®) or indinavir sulfate (Crixivan®)
- ketoconazole or itraconazole (such as Nizoral® or Sporanox®)
- erythromycin
- other medicines or treatments for ED

HOW SHOULD YOU TAKE LEVITRA?

Take LEVITRA exactly as your doctor prescribes. LEVITRA comes in different doses (2.5 mg, 5 mg, 10 mg, and 20 mg). For most men, the recommended starting dose is 10 mg. **Take LEVITRA no more than once a day.** Doses should be taken at least 24 hours apart. Some men can only take a low dose of LEVITRA because of medical conditions or medicines they take. Your doctor will prescribe the dose that is right for you.

- If you are older than 65 or have liver problems, your doctor may start you on a lower dose of LEVITRA.
- If you are taking certain other medicines your doctor may prescribe a lower starting dose and limit you to one dose of LEVITRA in a 72-hour (3 days) period.

Take 1 LEVITRA tablet about 1 hour (60 minutes) before sexual activity. Some form of sexual stimulation is needed for an erection to happen with LEVITRA. LEVITRA may be taken with or without meals.

Do not change your dose of LEVITRA without talking to your doctor. Your doctor may lower your dose or raise your dose, depending on how your body reacts to LEVITRA.

If you take too much LEVITRA, call your doctor or emergency room right away.

WHAT ARE THE POSSIBLE SIDE EFFECTS OF LEVITRA?

The most common side effects with LEVITRA are headache, flushing, stuffy or runny nose, indigestion, upset stomach, or dizziness. These side effects usually go away after a few hours. Call your doctor if you get a side effect that bothers you or one that will not go away.

LEVITRA may uncommonly cause:

- **an erection that won’t go away (priapism).** If you get an erection that lasts more than 4 hours, get medical help right away. Priapism must be treated as soon as possible or lasting damage can happen to your penis including the inability to have erections.
- **vision changes**, such as seeing a blue tinge to objects or having difficulty telling the difference between the colors blue and green.

These are not all the side effects of LEVITRA. For more information, ask your doctor or pharmacist.

HOW SHOULD LEVITRA BE STORED?

- Store LEVITRA at room temperature between 59° and 86° F (15° to 30° C).
- **Keep LEVITRA and all medicines out of the reach of children.**

GENERAL INFORMATION ABOUT LEVITRA.

Medicines are sometimes prescribed for conditions other than those described in patient information leaflets. Do not use LEVITRA for a condition for which it was not prescribed. Do not give LEVITRA to other people, even if they have the same symptoms that you have. It may harm them.

This leaflet summarizes the most important information about LEVITRA. If you would like more information, talk with your healthcare provider. You can ask your doctor or pharmacist for information about LEVITRA that is written for health professionals.

For more information you can also visit www.LEVITRA.com, or call 1-866-LEVITRA.

WHAT ARE THE INGREDIENTS OF LEVITRA?

Active Ingredient: vardenafil hydrochloride

Inactive Ingredients: microcrystalline cellulose, crospovidone, colloidal silicon dioxide, magnesium stearate, hypromellose, polyethylene glycol, titanium dioxide, yellow ferric oxide, and red ferric oxide.

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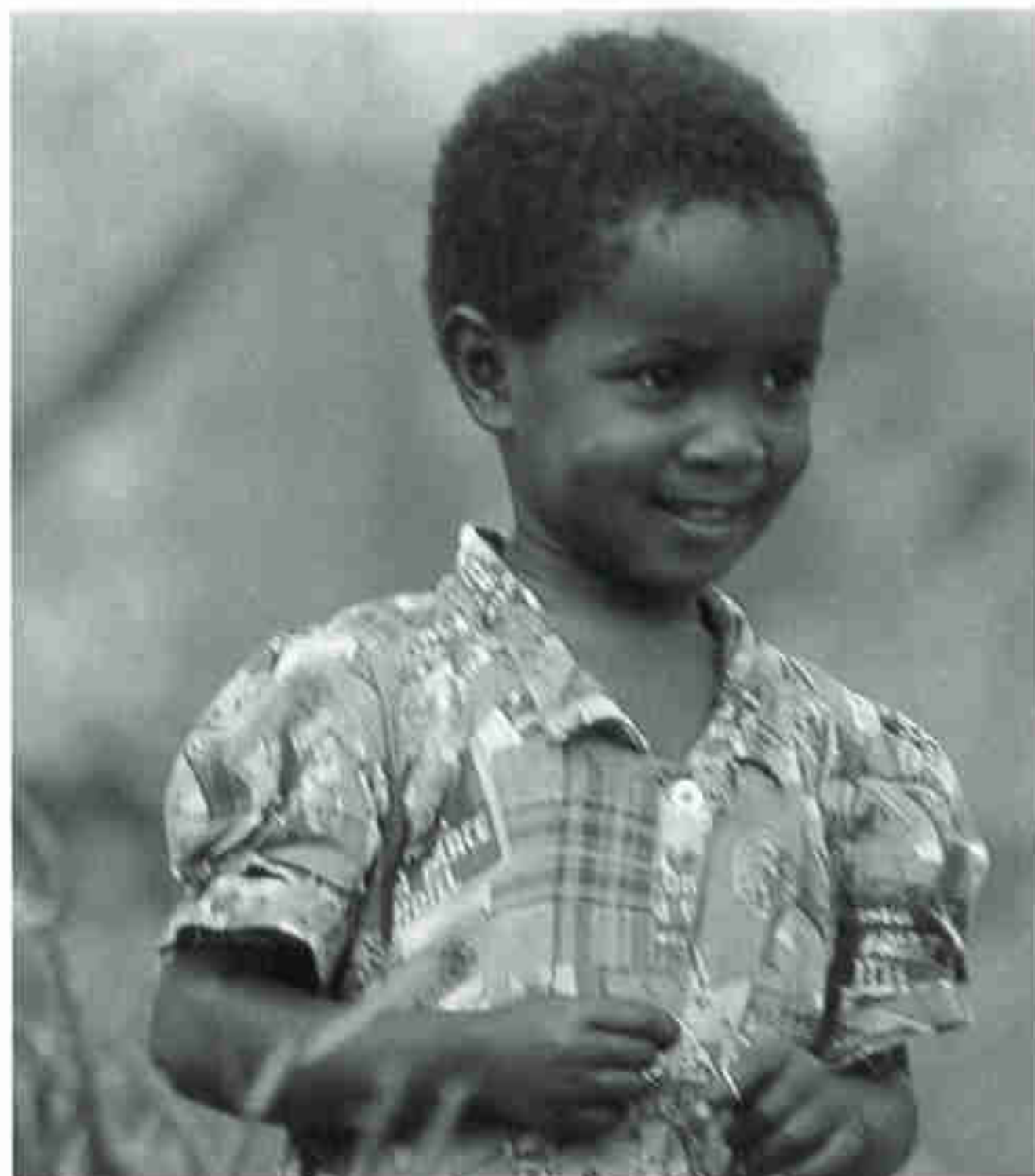
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MAYA ROYAL GRAVE (SEE PAGE 66)



KENNETH GARRETT

GO THERE

Explore Maya History in Guatemala

Since 1996, when peace accords ended decades of civil war, Guatemala has made efforts to protect its archaeological treasures and improve tourism infrastructure—although crime continues to be a problem and unpaved roads a reality. Still, Guatemala is the best place to experience the full arc of Maya history, from the Olmec period to the Classic period to today's vibrant Maya culture. Start in the south at Takalik Abaj, the subject of a feature story in this issue. One of Guatemala's newest national archaeological parks, the site has some of the earliest Maya writing and sculpture ever found. Then check out Kaminaljuyú (see "Picks," right) in Guatemala City and Tikal National Park (above). A city of 60,000 thrived at Tikal at the height of the Classic period. Thousands of structures were built there; you can still see ruins of many of them.

TRY IT AT HOME

Incense, Maya Style

The Maya have burned incense for more than 2,000 years. At Takalik Abaj, researchers recently found an incense burner decorated with the head of a woman wearing a headdress with cacao beans. The incense used in it was likely copal, made from aromatic resin gathered from trees. The Maya often call this incense



THOMAS HOEPKER, MAGNUM PHOTOS

pom; it's used in ceremonies as an offering to heaven (above). If you can't get to Maya country to buy authentic copal at markets, some

incense shops carry it, either as pieces of molded resin or in stick form. But beware: Copal incense can create a lot of smoke while burning.

PICKS

3 ruins

The most famous—and most visited—Maya ruins date from the Classic period (A.D. 250–900). But archaeologist **Christa Schieber de Lavarreda**, co-leader of a Guatemalan government research project at Takalik Abaj, is fascinated by an earlier time, the Late Preclassic period (400 B.C.–A.D. 250), when Maya cultural expression began to blossom. Her favorite sites:

■ **Uaxactún** Just north of Tikal in the lowland rain forest. Highlight: elaborate stucco masks that decorate one of the most beautiful early Maya buildings ever discovered.

■ **Kaminaljuyú** In a surprising location: the outskirts of modern Guatemala City. Connected to Takalik Abaj by an important trade route. Site of two early royal graves and some of the oldest glyphs known.

■ **Nakbé** Hidden deep in the northern jungles of the Petén. Home to two of the earliest Maya stone stelae, similar to those found in Takalik Abaj and Kaminaljuyú in the south.

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See more pictures from Takalik Abaj and get photo tips at nationalgeographic.com/magazine/0405.



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Behind the SCENES

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“**S**he was at a poultry show in Chicago. A picture like that sticks with you,” says Bill Bonner (below) of the woman on the cover of our latest special issue, *100 Best Vintage Photographs* (right). Bonner, the Geographic’s photo archivist, should know. For over 20 years he’s kept track of the historical, quirky, poignant, and just plain strange photographs that make up the Society’s ever growing Image Collection.

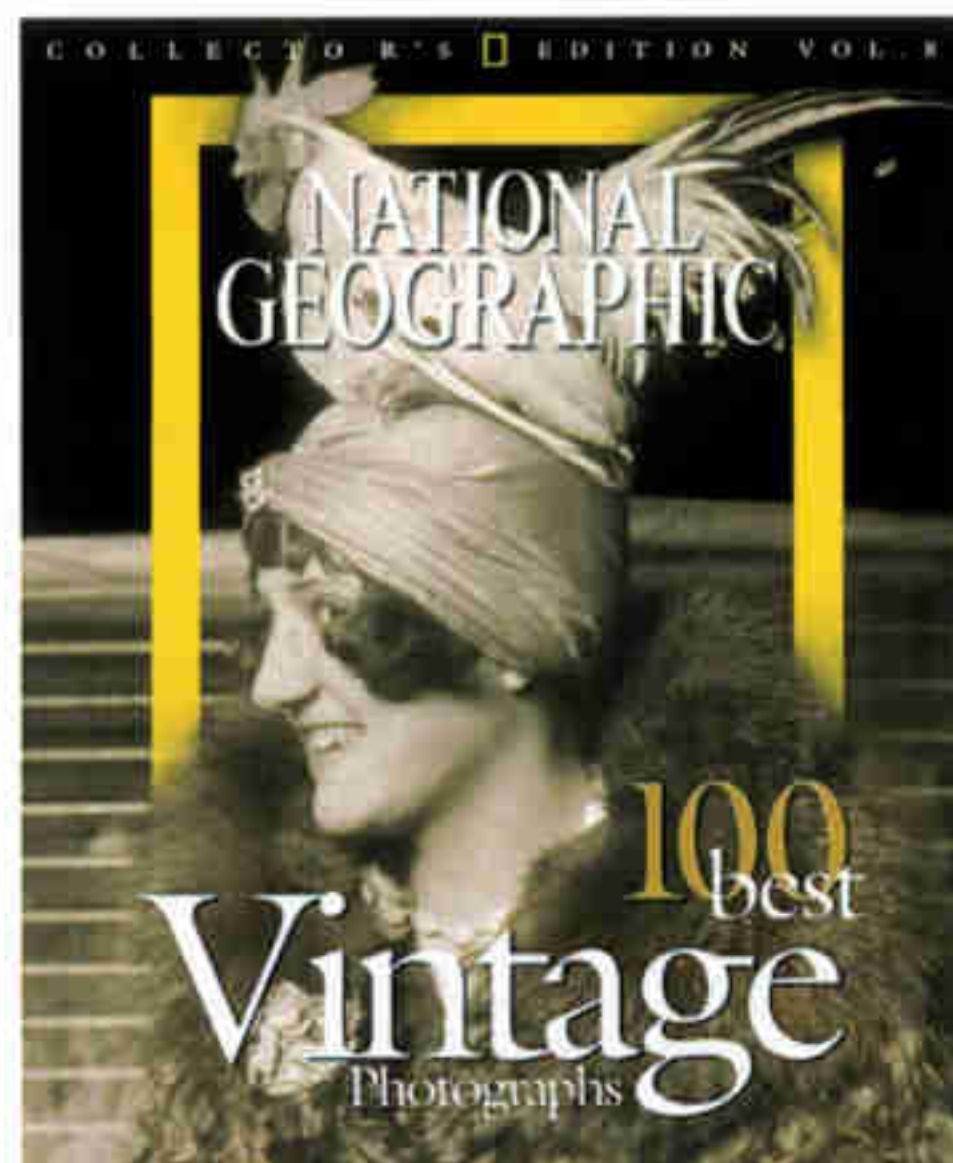


ROBB KENDRICK

Eight years ago the magazine began tapping his knowledge to help come up with pictures for our monthly Flashback page. Finding a historical photograph that relates to one of the stories in a given issue isn’t always easy: The archive’s half million unpublished black-and-white prints, all of which reside in a climate-controlled environment in the headquarters basement, are cataloged on typewritten cards arranged by general subject. Some date back to the late 19th century, when the Society was just beginning. Only part of the massive collection is cataloged on computer.

“Bill has decades in the archives and he knows where to look,” says illustrations editor Susan Welchman. “He just goes straight to the right envelope.” Says Bill, “It’s like looking for gold: You know when you’ve found it. It’s visceral.”

Not all of the memorable images that Bonner has pulled out of those envelopes made it into the magazine, but now they’ll get



their due in this special issue. “We have so many incredible pictures that people have never seen until now,” says Susan. They include images from the private collections of Alexander Graham Bell, the Society’s second president, and from NATIONAL GEOGRAPHIC’s longtime editor Gilbert H. Grosvenor. There are also military photographs from both World Wars and historic shots from famous expeditions.

“Bill has quietly loved those pictures for all his years here,” says Susan. “Now he’s sharing that love with everyone else.”

For an online preview of *100 Best Vintage Photographs*, go to nationalgeographic.com/magazine/bestvintage.

Farewell to an Old Friend

“Snowflake is the ham, the crowd-pleaser, with the persistence of a circus clown”—that’s how the October 1970 issue of the GEOGRAPHIC described the world’s first known albino gorilla. Found clinging to his slain mother in 1966, the blue-eyed baby was discovered by a farmer in Equatorial Guinea, then a colony of Spain. After being moved to the Barcelona Zoo, Snowflake became an international celebrity. Despite his albinism—which can shorten life expectancy—he lived to about age 40, the norm for a captive male gorilla. Late last year he succumbed to skin cancer. He is survived by 13 descendants, none albino.



CESAR RANGEL, AFP/GETTY IMAGES



*Based on a U.S. emissions study (2002) by the Union of Concerned Scientists. The Union of Concerned Scientists is an independent organization. Results do not imply endorsement of Honda or its products. †Based on EPA mileage estimates for Civic Hybrid with MT. CA model may get up to 550 miles per tank. Actual mileage may vary. ©2003 American Honda Motor Co., Inc. honda.com

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Where in the World?

Match wits with past Geographic Bee winners

Each May, Geographic Bee finalists gather at our Washington, D.C., headquarters to vie for top honors—and a \$25,000 scholarship. Think you could compete with these 10-to-15-year-olds? Here's your chance. (Answers listed below.)

See the 2004 Bee, sponsored by ING, on May 26 on the National Geographic Channel and later on public television stations. Check local listings for times.



ANNIE GRIFFITHS BELT (ABOVE); PETER McBRIDE

Test Your Geo Smarts

- 1. Which country** bordering Myanmar became an independent nation in 1971?
- 2. Name the European** principal-ity whose heads of state are the president of France and the bishop of Urgell.
- 3. Name the national capital** that is a major port on a strait connecting the Kattegat with the Baltic Sea.
- 4. Mount Erebus** is a volcano on which continent?
- 5. Name the most** populous country in Central America.
- 6. If a plane flies northwest** over Victoria Falls (left), what country will it fly over once it crosses the Zambezi River?
- 7. Name the political region** of Russia that is separated from the rest of the country by Lithuania.
- 8. The Mozambique Channel**

separates what large island country from the mainland of Africa?

- 9. Camels provide transportation** for goods and people in the desert near Aqaba (above). Aqaba is in which Middle Eastern country?
- 10. What type of landform** is commonly associated with orographic precipitation?
- 11. Cable cars** carry tourists to the top of Brazil's Sugar Loaf mountain for a view of which coastal city?
- 12. Goa**, a state in southwestern India, was a possession of which country until 1961?
- 13. The condition** characterized by unusually cold ocean temperatures in the equatorial region of the eastern Pacific Ocean is known by what Spanish name?
- 14. Name the zone** that lies below a glacier's equilibrium line, where melting, evaporation, and sublimation occur.

1. BANGLADESH 2. ANDORRA 3. COPENHAGEN 4. ANTARCTICA 5. GUATEMALA 6. ZAMBIA 7. KALININGRAD 8. MADAGASCAR 9. JORDAN 10. MOUNTAIN 11. RIO DE JANEIRO 12. PORTUGAL 13. LA NIÑA 14. ZONE OF ABLATION

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BALLARD EXPEDITION (PAGE 112)

- **Mystery of the Ancient Seafarers** book. Learn how Robert Ballard uses modern technology to reveal the truth behind the myths of the ancient maritime civilizations of Turkey, Egypt, Greece, Crete, Italy, and Malta. Available June 2004 (\$35).
- **Mysteries of the Deep: Legendary Shipwrecks** DVD set. Discover the real-life stories of the world's most famous shipwrecks. Join Ballard as he finds the *Titanic*, explores lost ships of the Mediterranean, and reconstructs the last voyage of the *Lusitania* (\$49.95).
- **One-Stop Research** Search here for links to online Ballard resources, including a video interview on exploring the Black Sea. Learn more at nationalgeographic.com/onestop.

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tablets
FOR CHOLESTEROL

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LIPITOR® (atorvastatin calcium) is a prescription drug. It is used with a low-fat diet to lower cholesterol.

LIPITOR is not for everyone. It is not for those with liver problems. And it is not for women who are nursing, pregnant, or may get pregnant. It has not been shown to prevent heart disease or heart attacks.

If you take LIPITOR, tell your doctor if you feel any new muscle pain or weakness. This could be a sign of serious side effects. Tell your doctor about all the medicines you take. This may help avoid serious drug interactions. Your doctor may do blood tests to check your liver function before and during treatment. The most common side effects are gas, constipation, stomach pain and heartburn. They tend to be mild and often go away.

Please see additional important information on next page.

LIPITOR® (Atorvastatin Calcium) Tablets
Brief Summary of Prescribing Information

CONTRAINDICATIONS: Active liver disease or unexplained persistent elevations of serum transaminases. Hypersensitivity to any component of this medication. **Pregnancy and Lactation** — Atherosclerosis is a chronic process and discontinuation of lipid-lowering drugs during pregnancy should have little impact on the outcome of long-term therapy of primary hypercholesterolemia. Cholesterol and other products of cholesterol biosynthesis are essential components for fetal development (including synthesis of steroids and cell membranes). Since HMG-CoA reductase inhibitors decrease cholesterol synthesis and possibly the synthesis of other biologically active substances derived from cholesterol, they may cause fetal harm when administered to pregnant women. Therefore, HMG-CoA reductase inhibitors are contraindicated during pregnancy and in nursing mothers. ATORVASTATIN SHOULD BE ADMINISTERED TO WOMEN OF CHILDBEARING AGE ONLY WHEN SUCH PATIENTS ARE HIGHLY UNLIKELY TO CONCEIVE AND HAVE BEEN INFORMED OF THE POTENTIAL HAZARDS. If the patient becomes pregnant while taking this drug, therapy should be discontinued and the patient apprised of the potential hazard to the fetus.

WARNINGS: Liver Dysfunction — HMG-CoA reductase inhibitors, like some other lipid-lowering therapies, have been associated with biochemical abnormalities of liver function. **Persistent elevations (>3 times the upper limit of normal [ULN] occurring on 2 or more occasions) in serum transaminases occurred in 0.7% of patients who received atorvastatin in clinical trials. The incidence of these abnormalities was 0.2%, 0.2%, 0.6%, and 2.3% for 10, 20, 40, and 80 mg, respectively.** One patient in clinical trials developed jaundice. Increases in liver function tests (LFT) in other patients were not associated with jaundice or other clinical signs or symptoms. Upon dose reduction, drug interruption, or discontinuation, transaminase levels returned to or near pretreatment levels without sequelae. Eighteen of 30 patients with persistent LFT elevations continued treatment with a reduced dose of atorvastatin. **It is recommended that liver function tests be performed prior to and at 12 weeks following both the initiation of therapy and any elevation of dose, and periodically (eg, semiannually) thereafter.** Liver enzyme changes generally occur in the first 3 months of treatment with atorvastatin. Patients who develop increased transaminase levels should be monitored until the abnormalities resolve. Should an increase in ALT or AST of >3 times ULN persist, reduction of dose or withdrawal of atorvastatin is recommended. Atorvastatin should be used with caution in patients who consume substantial quantities of alcohol and/or have a history of liver disease. Active liver disease or unexplained persistent transaminase elevations are contraindications to the use of atorvastatin (see CONTRAINDICATIONS). **Skeletal Muscle** — **Rare cases of rhabdomyolysis with acute renal failure secondary to myoglobinuria have been reported with atorvastatin and with other drugs in this class.** Uncomplicated myalgia has been reported in atorvastatin-treated patients (see ADVERSE REACTIONS). Myopathy, defined as muscle aches or muscle weakness in conjunction with increases in creatine phosphokinase (CPK) values >10 times ULN, should be considered in any patient with diffuse myalgias, muscle tenderness or weakness, and/or marked elevation of CPK. Patients should be advised to report promptly unexplained muscle pain, tenderness or weakness, particularly if accompanied by malaise or fever. Atorvastatin therapy should be discontinued if markedly elevated CPK levels occur or myopathy is diagnosed or suspected. The risk of myopathy during treatment with drugs in this class is increased with concurrent administration of cyclosporine, fibric acid derivatives, erythromycin, niacin, or azole antifungals. Physicians considering combined therapy with atorvastatin and fibric acid derivatives, erythromycin, immunosuppressive drugs, azole antifungals, or lipid-lowering doses of niacin should carefully weigh the potential benefits and risks and should carefully monitor patients for any signs or symptoms of muscle pain, tenderness, or weakness, particularly during the initial months of therapy and during any periods of upward dosage titration of either drug. Periodic creatine phosphokinase (CPK) determinations may be considered in such situations, but there is no assurance that such monitoring will prevent the occurrence of severe myopathy. **Atorvastatin therapy should be temporarily withheld or discontinued in any patient with an acute, serious condition suggestive of a myopathy or having a risk factor predisposing to the development of renal failure secondary to rhabdomyolysis (eg, severe acute infection, hypotension, major surgery, trauma, severe metabolic, endocrine and electrolyte disorders, and uncontrolled seizures).**

PRECAUTIONS: General — Before instituting therapy with atorvastatin, an attempt should be made to control hypercholesterolemia with appropriate diet, exercise, and weight reduction in obese patients, and to treat other underlying medical problems (see INDICATIONS AND USAGE in full prescribing information). **Information for Patients** — Patients should be advised to report promptly unexplained muscle pain, tenderness, or weakness, particularly if accompanied by malaise or fever. **Drug Interactions** — The risk of myopathy during treatment with drugs of this class is increased with concurrent administration of cyclosporine, fibric acid derivatives, niacin (nicotinic acid), erythromycin, azole antifungals (see WARNINGS, Skeletal Muscle). **Antacid:** When atorvastatin and Maalox® TC suspension were coadministered, plasma concentrations of atorvastatin decreased approximately 35%. However, LDL-C reduction was not altered. **Antipyrine:** Because atorvastatin does not affect the pharmacokinetics of antipyrine, interactions with other drugs metabolized via the same cytochrome isozymes are not expected. **Colestipol:** Plasma concentrations of atorvastatin decreased approximately 25% when colestipol and atorvastatin were coadministered. However, LDL-C reduction was greater when atorvastatin and colestipol were coadministered than when either drug was given alone. **Cimetidine:** Atorvastatin plasma concentrations and LDL-C reduction were not altered by coadministration of cimetidine. **Digoxin:** When multiple doses of atorvastatin and digoxin were coadministered, steady-state plasma digoxin concentrations increased by approximately 20%. Patients taking digoxin should be monitored appropriately. **Erythromycin:** In healthy individuals, plasma concentrations of atorvastatin increased approximately 40% with coadministration of atorvastatin and erythromycin, a known inhibitor of cytochrome P450 3A4 (see WARNINGS, Skeletal Muscle). **Oral Contraceptives:** Coadministration of atorvastatin and an oral contraceptive increased AUC values for norethindrone and ethinyl estradiol by approximately 30% and 20%. These increases should be considered when selecting an oral contraceptive for a woman taking atorvastatin. **Warfarin:** Atorvastatin had no clinically significant effect on prothrombin time when administered to patients receiving chronic warfarin treatment. **Endocrine Function** — HMG-CoA reductase inhibitors interfere with cholesterol synthesis and theoretically might blunt adrenal and/or gonadal steroid production. Clinical studies have shown that atorvastatin does not reduce basal plasma cortisol concentration or impair adrenal reserve. The effects of HMG-CoA reductase inhibitors on male fertility have not been studied in adequate numbers of patients. The effects, if any, on the pituitary-gonadal axis in premenopausal women are unknown. Caution should be exercised if an HMG-CoA reductase inhibitor is administered concomitantly with drugs that may decrease the levels or activity of endogenous steroid hormones, such as ketoconazole, spironolactone, and cimetidine. **CNS Toxicity** — Brain hemorrhage was seen in a female dog treated for 3 months at 120 mg/kg/day. Brain hemorrhage and optic nerve vacuolation were seen in another female dog that was sacrificed in moribund condition after 11 weeks of escalating doses up to 280 mg/kg/day. The 120 mg/kg dose resulted in a systemic exposure approximately 16 times the human plasma area-under-the-curve (AUC, 0-24 hours) based on the maximum human dose of 80 mg/day. A single tonic convulsion was seen in each of 2 male dogs (one treated at 10 mg/kg/day and one at 120 mg/kg/day) in a 2-year study. No CNS lesions have been observed in mice after chronic treatment for up to 2 years at doses up to 400 mg/kg/day or in rats at doses up to 100 mg/kg/day. These doses were 6 to 11 times (mouse) and 8 to 16 times (rat) the human AUC (0-24) based on the maximum recommended human dose of 80 mg/day. CNS vascular lesions, characterized by perivascular hemorrhages, edema, and mononuclear cell infiltration of perivascular spaces, have been observed in dogs treated with other members of this class. A chemically similar drug in this class produced optic nerve degeneration (Wallerian degeneration of retinogeniculate fibers) in clinically normal dogs in a dose-dependent fashion at a dose that produced plasma drug levels about 30 times higher than the mean drug level in humans taking the highest recommended dose. **Carcinogenesis, Mutagenesis, Impairment of Fertility** — In a 2-year carcinogenicity study in rats at dose levels of 10, 30, and 100 mg/kg/day, 2 rare tumors were found in muscle in high-dose females: in one, there was a rhabdomyosarcoma and, in another, there was a fibrosarcoma. This dose represents a plasma AUC (0-24) value of approximately 16 times the mean human plasma drug exposure after an 80 mg oral dose. A 2-year carcinogenicity study in mice given 100, 200, or 400 mg/kg/day resulted in a significant increase in liver adenomas in high-dose males and liver carcinomas in high-dose females. These findings occurred at plasma AUC (0-24) values of approximately 6 times the mean human plasma drug exposure after an 80 mg oral dose. *In vitro*, atorvastatin was not mutagenic or clastogenic in the following tests with and without metabolic activation: the Ames test with *Salmonella typhimurium* and *Escherichia coli*, the HGPRT forward mutation assay in Chinese hamster lung cells, and the chromosomal aberration assay in Chinese hamster lung cells. Atorvastatin was negative in the *in vivo* mouse micronucleus test. Studies in rats performed at doses up to 175 mg/kg (15 times the human exposure) produced no changes in fertility. There was aplasia and aspermia in the epididymis of 2 of 10 rats treated with 100 mg/kg/day of atorvastatin for 3 months (16 times the human AUC at the 80 mg dose); testis weights were significantly lower at 30 and 100 mg/kg and epididymal weight was lower at 100 mg/kg. Male rats given 100 mg/kg/day for 11 weeks prior to mating had decreased sperm motility, sperm head concentration, and increased abnormal sperm. Atorvastatin caused no adverse effects on semen parameters, or reproductive organ histopathology in dogs given doses of 10, 40, or 120 mg/kg for two years. **Pregnancy** — **Pregnancy Category X: See CONTRAINDICATIONS.** Safety in pregnant women has not been established. Atorvastatin crosses the rat placenta and reaches a level in fetal liver equivalent to that of maternal plasma. Atorvastatin was not teratogenic in rats at doses up to 300 mg/kg/day or in rabbits at doses up to 100 mg/kg/day. These doses resulted in multiples of about 30 times (rat) or 20 times (rabbit) the human exposure based on surface area (mg/m²). In a study in rats given 20, 100, or 225 mg/kg/day, from gestation day 7 through to lactation day 21 (weaning), there was decreased pup survival at birth, neonate, weaning, and maturity in pups of mothers dosed with 225 mg/kg/day. Body weight was decreased on days 4 and 21 in pups of mothers dosed at 100 mg/kg/day; pup body weight was decreased at birth and at days 4, 21, and 91 at 225 mg/kg/day. Pup development was delayed (rotorod performance at 100 mg/kg/day and acoustic startle at 225 mg/kg/day; pinnae detachment and eye opening at 225 mg/kg/day). These doses correspond to 6 times (100 mg/kg) and 22 times (225 mg/kg) the human AUC at 80 mg/day. Rare reports of congenital anomalies have been received

following intrauterine exposure to HMG-CoA reductase inhibitors. There has been one report of severe congenital bony deformity, tracheo-esophageal fistula, and anal atresia (VATER association) in a baby born to a woman who took lovastatin with dextroamphetamine sulfate during the first trimester of pregnancy. LIPITOR should be administered to women of child-bearing potential only when such patients are highly unlikely to conceive and have been informed of the potential hazards. If the woman becomes pregnant while taking LIPITOR, it should be discontinued and the patient advised again as to the potential hazards to the fetus. **Nursing Mothers** — Nursing rat pups had plasma and liver drug levels of 50% and 40%, respectively, of that in their mother's milk. Because of the potential for adverse reactions in nursing infants, women taking LIPITOR should not breast-feed (see CONTRAINDICATIONS). **Pediatric Use** — Safety and effectiveness in patients 10-17 years of age with heterozygous familial hypercholesterolemia have been evaluated in a controlled clinical trial of 6 months duration in adolescent boys and postmenarcheal girls. Patients treated with LIPITOR had an adverse experience profile generally similar to that of patients treated with placebo, the most common adverse experiences observed in both groups, regardless of causality assessment, were infections. **Doses greater than 20 mg have not been studied in this patient population.** In this limited controlled study, there was no detectable effect on growth or sexual maturation in boys or on menstrual cycle length in girls (see CLINICAL PHARMACOLOGY, Clinical Studies section in full prescribing information; ADVERSE REACTIONS, Pediatric Patients (ages 10-17 years); and DOSAGE AND ADMINISTRATION, Heterozygous Familial Hypercholesterolemia in Pediatric Patients (10-17 years of age) in full prescribing information. Adolescent females should be counseled on appropriate contraceptive methods while on LIPITOR therapy (see CONTRAINDICATIONS and PRECAUTIONS, Pregnancy). **LIPITOR has not been studied in controlled clinical trials involving pre-pubertal patients or patients younger than 10 years of age.** Clinical efficacy with doses up to 80 mg/day for 1 year have been evaluated in an uncontrolled study of patients with homozygous FH including 8 pediatric patients (see CLINICAL PHARMACOLOGY, Clinical Studies: *Homozygous Familial Hypercholesterolemia* in full prescribing information). **Geriatric Use** — The safety and efficacy of atorvastatin (10-80 mg) in the geriatric population (>65 years of age) was evaluated in the ACCESS study. In this 54-week open-label trial 1,958 patients initiated therapy with atorvastatin 10 mg. Of these, 835 were elderly (>65 years) and 1,123 were non-elderly. The mean change in LDL-C from baseline after 6 weeks of treatment with atorvastatin 10 mg was -38.2% in the elderly patients versus -34.6% in the non-elderly group. The rates of discontinuation due to adverse events were similar between the two age groups. There were no differences in clinically relevant laboratory abnormalities between the age groups.

ADVERSE REACTIONS: LIPITOR is generally well-tolerated. Adverse reactions have usually been mild and transient. In controlled clinical studies of 2502 patients, <2% of patients were discontinued due to adverse experiences attributable to atorvastatin. The most frequent adverse events thought to be related to atorvastatin were constipation, flatulence, dyspepsia, and abdominal pain. **Clinical Adverse Experiences** — Adverse experiences reported in ≥2% of patients in placebo-controlled clinical studies of atorvastatin, regardless of causality assessment, are shown in the following table.

Adverse Events in Placebo-Controlled Studies (% of Patients)					
BODY SYSTEM Adverse Event	Placebo N = 270	Atorvastatin 10 mg N = 863	Atorvastatin 20 mg N = 36	Atorvastatin 40 mg N = 79	Atorvastatin 80 mg N = 94
BODY AS A WHOLE					
Infection	10.0	10.3	2.8	10.1	7.4
Headache	7.0	5.4	16.7	2.5	6.4
Accidental Injury	3.7	4.2	0.0	1.3	3.2
Flu Syndrome	1.9	2.2	0.0	2.5	3.2
Abdominal Pain	0.7	2.8	0.0	3.8	2.1
Back Pain	3.0	2.8	0.0	3.8	1.1
Allergic Reaction	2.6	0.9	2.8	1.3	0.0
Asthenia	1.9	2.2	0.0	3.8	0.0
DIGESTIVE SYSTEM					
Constipation	1.8	2.1	0.0	2.5	1.1
Diarrhea	1.5	2.7	0.0	3.8	5.3
Dyspepsia	4.1	2.3	2.8	1.3	2.1
Flatulence	3.3	2.1	2.8	1.3	1.1
RESPIRATORY SYSTEM					
Sinusitis	2.6	2.8	0.0	2.5	6.4
Pharyngitis	1.5	2.5	0.0	1.3	2.1
SKIN AND APPENDAGES					
Rash	0.7	3.9	2.8	3.8	1.1
MUSCULOSKELETAL SYSTEM					
Arthralgia	1.5	2.0	0.0	5.1	0.0
Myalgia	1.1	3.2	5.6	1.3	0.0

The following adverse events were reported, regardless of causality assessment in patients treated with atorvastatin in clinical trials. The events in *italics* occurred in ≥2% of patients and the events in plain type occurred in <2% of patients.

Body as a Whole: Chest pain, face edema, fever, neck rigidity, malaise, photosensitivity reaction, generalized edema. **Digestive System:** Nausea, gastroenteritis, liver function tests abnormal, colitis, vomiting, gastritis, dry mouth, rectal hemorrhage, esophagitis, eructation, glossitis, mouth ulceration, anorexia, increased appetite, stomatitis, biliary pain, cheilitis, duodenal ulcer, dysphagia, enteritis, melena, gum hemorrhage, stomach ulcer, tenesmus, ulcerative stomatitis, hepatitis, pancreatitis, cholestatic jaundice. **Respiratory System:** Bronchitis, rhinitis, pneumonia, dyspnea, asthma, epistaxis. **Nervous System:** Insomnia, dizziness, paresthesia, somnolence, amnesia, abnormal dreams, libido decreased, emotional lability, incoordination, peripheral neuropathy, torticollis, facial paralysis, hyperkinesia, depression, hypesthesia, hypertonia. **Musculoskeletal System:** Arthritis, leg cramps, bursitis, tenosynovitis, myasthenia, tendinous contracture, myositis. **Skin and Appendages:** Pruritus, contact dermatitis, alopecia, dry skin, sweating, acne, urticaria, eczema, seborrhea, skin ulcer. **Urogenital System:** Urinary tract infection, urinary frequency, cystitis, hematuria, impotence, dysuria, kidney calculus, nocturia, epididymitis, fibrocystic breast, vaginal hemorrhage, albuminuria, breast enlargement, metrorrhagia, nephritis, urinary incontinence, urinary retention, urinary urgency, abnormal ejaculation, uterine hemorrhage. **Special Senses:** Amblyopia, tinnitus, dry eyes, refraction disorder, eye hemorrhage, deafness, glaucoma, parosmia, taste loss, taste perversion. **Cardiovascular System:** Palpitation, vasodilatation, syncope, migraine, postural hypotension, phlebitis, arrhythmia, angina pectoris, hypertension. **Metabolic and Nutritional Disorders:** Peripheral edema, hyperglycemia, creatine phosphokinase increased, gout, weight gain, hypoglycemia. **Hemic and Lymphatic System:** Ecchymosis, anemia, lymphadenopathy, thrombocytopenia, petechia. **Postintroduction Reports** — Adverse events associated with LIPITOR therapy reported since market introduction, that are not listed above, regardless of causality assessment, include the following: anaphylaxis, angioneurotic edema, bullous rashes (including erythema multiforme, Stevens-Johnson syndrome, and toxic epidermal necrolysis), and rhabdomyolysis. **Pediatric Patients (ages 10-17 years)** In a 26-week controlled study in boys and postmenarcheal girls (n=140), the safety and tolerability profile of LIPITOR 10 to 20 mg daily was generally similar to that of placebo (see CLINICAL PHARMACOLOGY, Clinical Studies section in full prescribing information and PRECAUTIONS, Pediatric Use).

OVERDOSAGE: There is no specific treatment for atorvastatin overdose. In the event of an overdose, the patient should be treated symptomatically, and supportive measures instituted as required. Due to extensive drug binding to plasma proteins, hemodialysis is not expected to significantly enhance atorvastatin clearance.

Please see full prescribing information for additional information about LIPITOR.

Rx only

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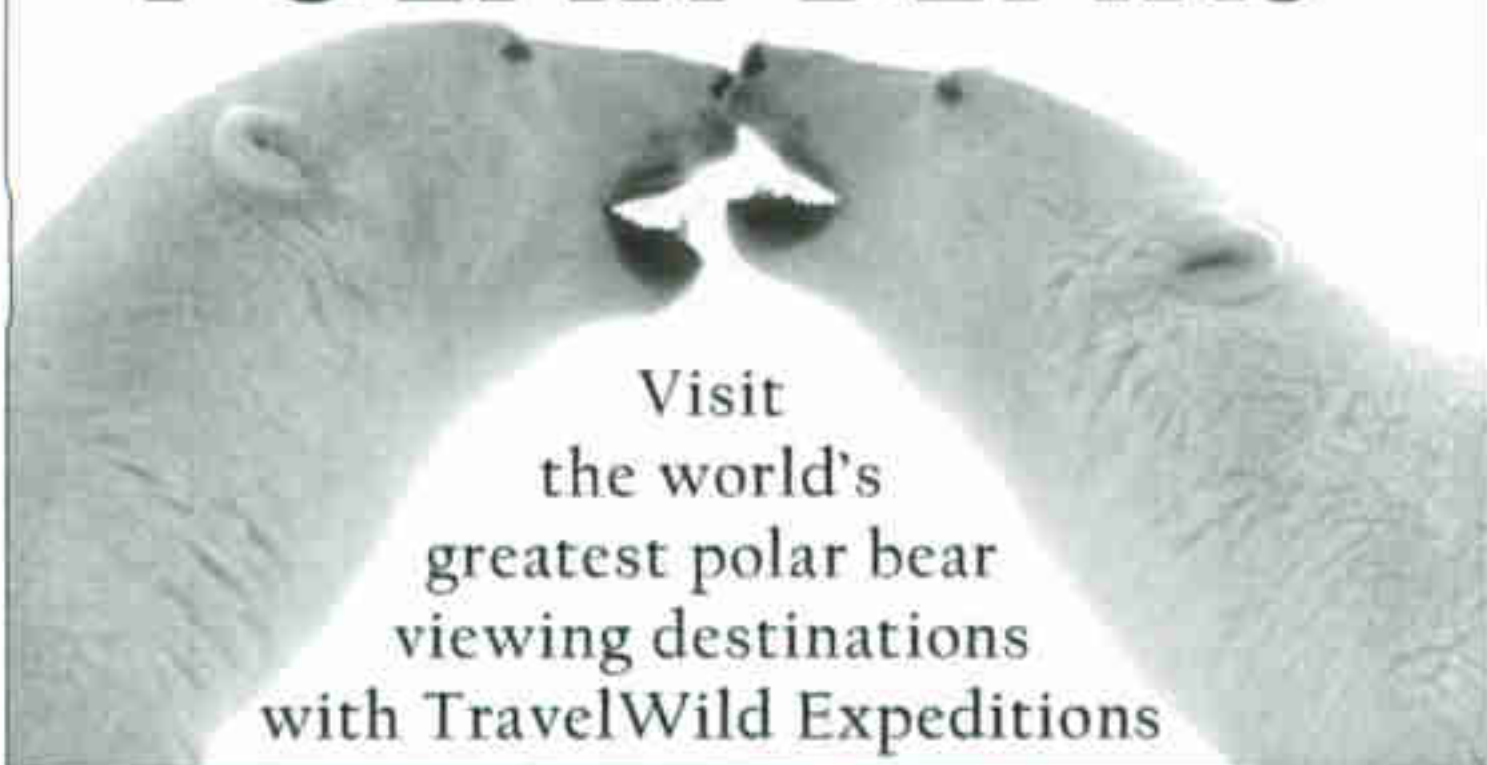
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Who Knew?

CHEMISTRY

Ties That Bind

Water is weird—thanks to the hydrogen bond

Just because water is everywhere—percolating through the ground, hovering in clouds, sloshing around our cells—doesn't make it any less weird.

Water dissolves a lot of the basic rules of chemistry. Most substances get denser as they turn from liquid to solid form, their molecules stacking up neatly like boards in a woodpile. But water doesn't do that. If it did, the ice cube in your drink would sink. Water expands when it freezes, forming latticelike structures with lots of gaps between molecules. Instead of a woodpile, ice molecules are more like a house.

Squeeze most solid substances in a vise, and they become denser solids (or break into pieces). Squeeze ice in a vise and it gets denser by turning to a liquid. Release the pressure, and the water turns back into ice. The principle works with glaciers: The weight of the glacier creates a liquid layer at the bottom that helps the glacier to slide.

Another anomaly: Water has a higher boiling point than many other substances. It's a good thing too. If water had a lower

boiling point, the oceans would long ago have evaporated into the atmosphere, and Earth would be a lot more like Venus.

Scientists think they know the main reason for water's peculiarity: the hydrogen bond. Admittedly this concept is not the most evocative in the annals of science, but perhaps it's all in the inflection. Try saying suavely, "Bond. Hydrogen Bond."

A water molecule will typically link up with four others via this bond—each of the two hydrogen atoms in water grabbing an electron pair in different, nearby water molecules. These bonds have just the right amount of stickiness. It's a Goldilocks situation. You wouldn't want the bonds to be too weak, because water molecules would break apart and would be essentially useless. And if they were too strong, says chemist Martin

Chaplin, "you wouldn't get much flow, and water would behave more like glass."

Chaplin studies the way the hydrogen bonds in water affect biology. Think about what life is: ordinary matter in a highly organized state. Where does the organization come from?

Chaplin suspects the hydrogen bonds in water. Liquid

water may seem loosey-goosey—the way it feels, splashes around, drips, puddles, forms a bead. But in biochemical terms, these qualities are signs of structure,

not of chaos. Chaplin says water imposes structure on the arrangement of proteins in a cell and thus helps organize life itself.

Water is the lubricant, the grease that makes biochemistry possible. Water has given us oceans, clouds, rivers, lakes—and it helps shape everything alive on Earth. So the next time you stand on a beach and admire the beauty and vastness of the sea, or marvel at a seashell, remind yourself: It's all brought to you by the hydrogen bond.

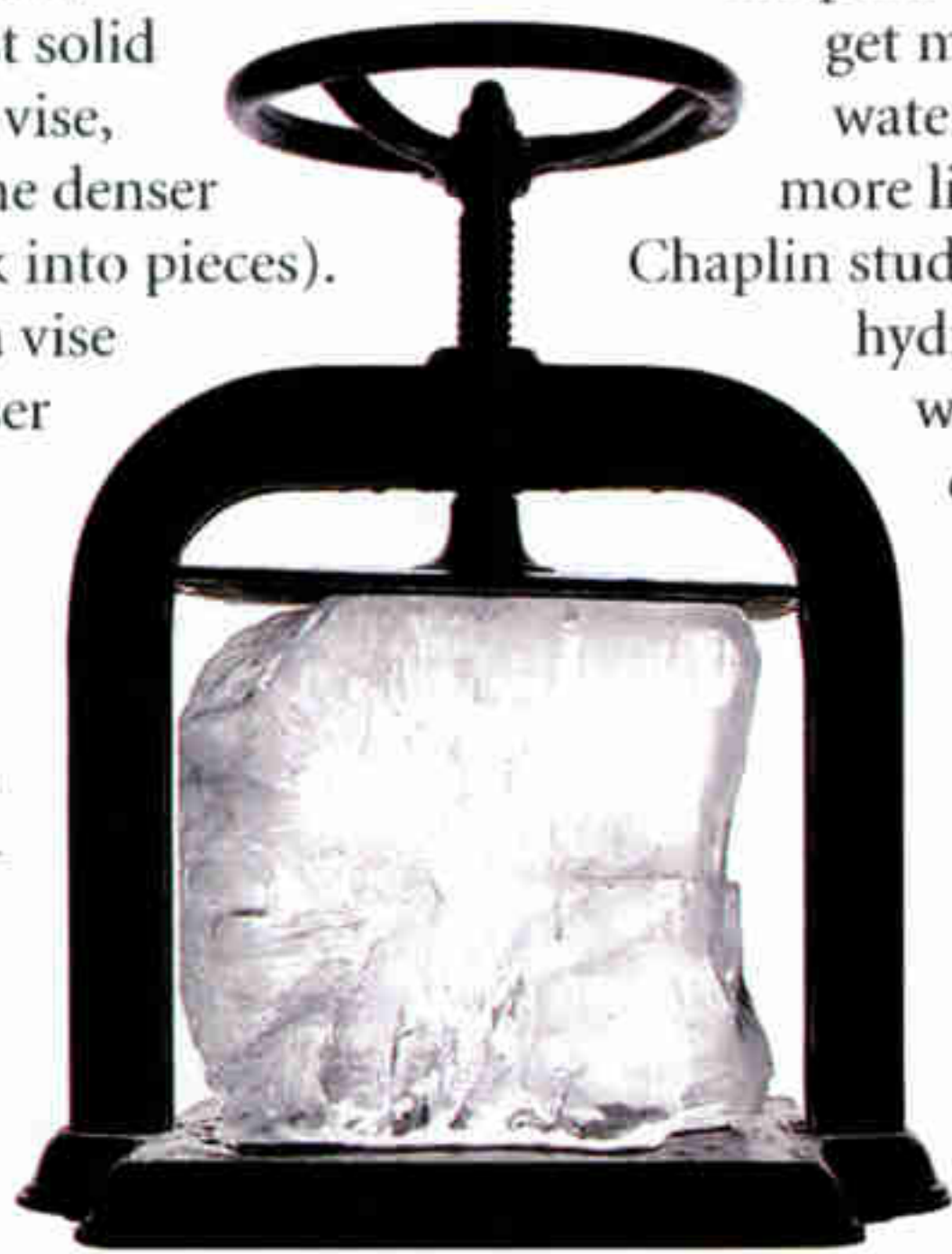
—Joel Achenbach

WASHINGTON POST STAFF WRITER

Boiling Hot? Maybe Not.

Water boils at 100°C—or 212°F—scalding hot by human standards. But that's at sea level. The boiling point of water, or any liquid for that matter, is determined not only by temperature but also by pressure. At higher altitudes, say in Denver, where atmospheric pressure is lower, the boiling point of water is lower too. Cooler boiling water takes longer to cook pasta (ten minutes in Cincinnati yields linguine al dente; after ten minutes in Denver your noodles are still crunchy), but it's also cooler to drink. People at very high altitudes (in Tibet, for example) can drink boiling hot tea without burning themselves. In the near vacuum of space, water at any temperature boils away because there isn't enough pressure to keep it liquid.

—Heidi Schultz



Change of HEAR

America's rural interior searches for new horizons

After years of drought and depopulation, many parts of the Great Plains again meet the 19th-century definition of frontier territory: an area with no more than six people per square mile.

As farmers and ranchers forsake the heartland, native prairie, native buffalo, and Native Americans are staging a comeback.



A THUNDERSTORM HALTS HAYING IN NEBRASKA'S SAND HILLS
ARTHUR COUNTY, NEBRASKA

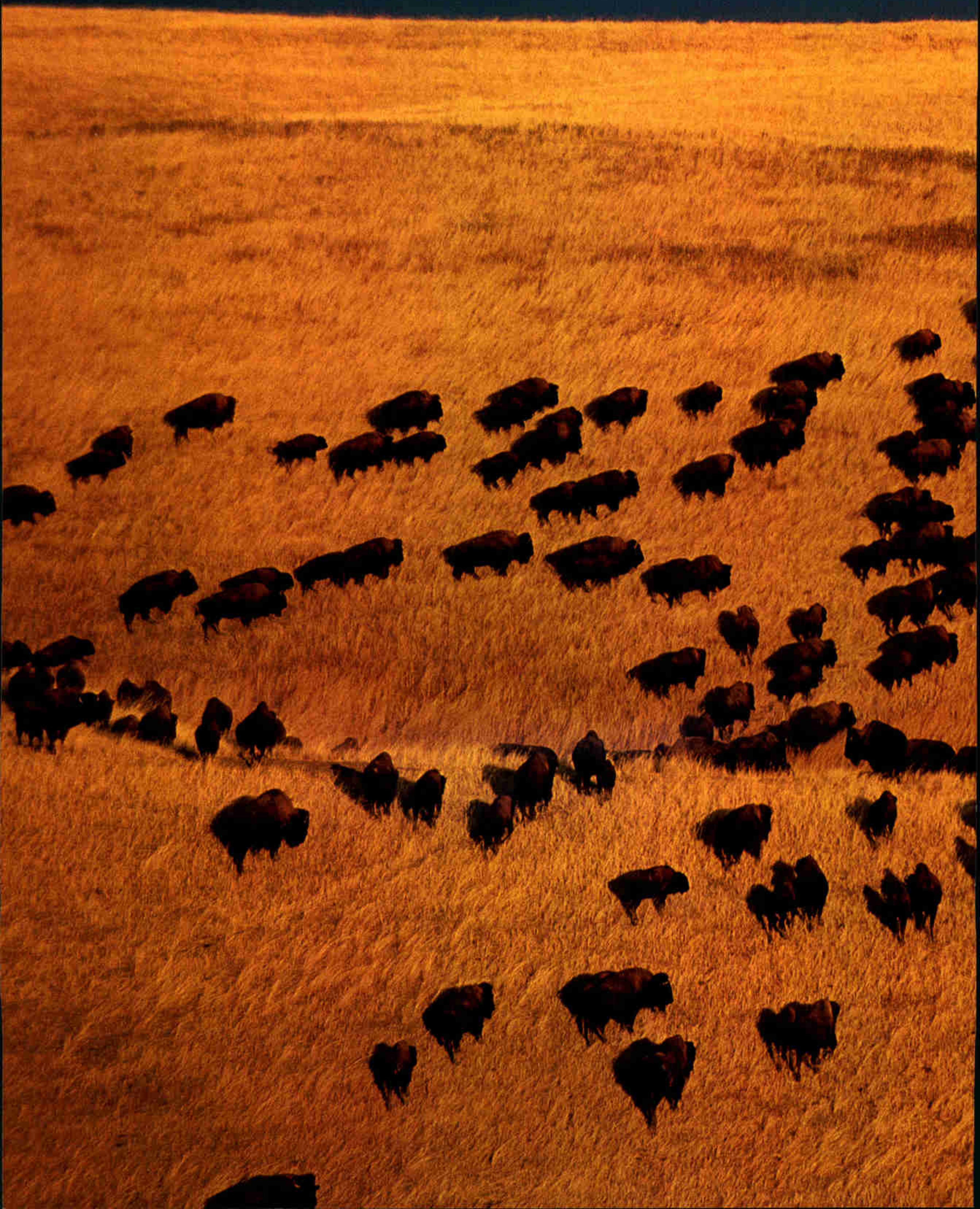
THE GREAT PLAINS | PART 1

TLAND



STARS OF THE RANGE, *bison graze on the Triple U Buffalo Ranch, backdrop for the film Dances With Wolves. Nearly wiped out by hide hunters in the 1870s, a quarter million bison are now raised on ranches as a low-fat alternative to beef.*

STANLEY COUNTY, SOUTH DAKOTA







RIDING A MODERN MOUNT, young women parade their finery—
shawls and elk-tooth dresses—at the annual Crow Fair, one of
the largest powwows in the country. Native American numbers
have nearly doubled in the Plains during the past two decades.

BIG HORN COUNTY, MONTANA



BY JOHN G. MITCHELL

PHOTOGRAPHS BY JIM RICHARDSON

A profound change is in

LEBANON, KANSAS, used to claim bragging rights as the geographical center of the United States, but you won't hear folks boast about that anymore. A town of some 300 people, perched amid fields of wheat and milo where the Sunflower State says hello to the Nebraska border, Lebanon has lately come to share a less singular distinction—as just one of many small rural communities that are fading away on the cusp of one of the world's richest breadbaskets. "Business U.S. 281," says a rusty sign on the highway as you drive into the center of town.

a brisk wind that carries with it a whiff of the good, rich, tillable earth. If, standing here at the monument, you could put out of mind the images your eyes just recorded back in town, you might experience a warm surge of pride yourself. But then you look beyond the monument and the fluttering flags and notice on a sunbaked ledge the tattered ghost of a long-shuttered one-story motel. And suddenly the thought occurs that while this particular country might be good for growing wheat, it was probably never intended to harvest tourists.

What has happened to Lebanon and the precincts of Smith County, Kansas, may not be typical of the Great Plains of the United States today, but it is no aberration either. The region has been experiencing a culture shock unlike any since the Great Depression of the 1930s, when drought and wind peeled the soil away and evicted the plowman with it. The Plains recovered to help feed the nation and the world and still export huge volumes of wheat and beef. Yet with technology displacing labor and paying jobs moving farther from home, the farms and ranches have another commodity to export to the city—their own children. Scores of remote rural counties have hemorrhaged population

at rates of 10 to 20 percent over past decades. In some communities the median age of residents is already creeping into the 60s.

For most Americans without roots or relatives in these parts, the Great Plains represent terra incognita. From the earliest rovers who dubbed this section of the country the Great American Desert to the overland settlers trekking the California and Oregon Trails, the Plains were always a place to get across and put behind you on the way to somewhere else. Even today window-seat transcontinental travelers at 30,000 feet are



SMITH COUNTY, KANSAS

But there's not much here in the way of commerce. Half the storefronts are boarded up. The bank and trust office is open, possibly shuffling foreclosures, but its windows stare across the street at the brick skeleton of an abandoned building. The sidewalks are empty.

At the edge of town another sign directs you to the site of yesteryear's pride. "Welcome to the Center of the USA," it says. There is a stone monument with a bronze plaque citing the center's exact lines of longitude and latitude. A Kansas state flag flaps beside the Stars and Stripes under

the wind: the unsettling of the Great Plains.

requested to pull down their shades; those amber waves of grain must not interfere with the in-flight movie. One of the occupational hazards of living on either coast is not knowing exactly where the Great Plains are, much less seeing them.

For starters, wrap your head around half a million square miles, an area about one-sixth the size of the lower forty-eight, embracing more than 400 counties in parts of 10 states stacked between the Canadian border and the mesquite of south Texas (map, page 10). On the west the foothills of the Rocky Mountains draw the line where the Plains play out. But in the east opinions differ. In 1931 the eminent historian Walter Prescott Webb fixed his line at the 98th meridian. He called it an “institutional fault,” west of which all the eastern ways of life and living were “either broken and remade or else greatly altered.” To trace Webb’s fault, drive a bit west of Fargo, North Dakota, and then drop due south, say, to Wichita Falls, Texas. Or eschew Webb and side with President Franklin Roosevelt’s Great Plains Committee, which, a few years later, pushed the line about a hundred miles farther west to the 100th meridian. Other criteria have been constructed to define the eastern edge of the Plains, such as the 2,000-foot contour or the 20-inch rainfall line, west of which conditions tend to get semiarid. However one might parse it, the Plains with their shorter grasses are not to be confused with the tallgrass prairie that once prevailed on the sunrise side of the 98th meridian, before Americans plowed it up to grow corn and hogs and robust midwestern cities.

One can find cities on the Plains too, though not very many. In fact, if you moseyed west of Webb’s line and skipped over the edge cities and the big oil-and-cow towns of Texas, you’d be hard-pressed to find in all that vast territory more than five municipalities with populations exceeding 50,000. Goes without saying that Lebanon isn’t one of them.

Neither is Seneca, in the Sand Hills of Nebraska. For all their rolling big-sky beauty, the hills have not only been losing population over the years, they have also been sinking into deep pockets of poverty. Five of the ten poorest counties in the United States, in terms of per capita income, are located here. Seneca itself sits beside the Burlington Northern Santa Fe Railroad in the shallow valley of the Middle Loup River. It used to be a thriving community of some 800 people when the railroad was making regular stops here for passengers and freight. There were two small hotels down by the tracks. But nowadays the trains no longer stop at Seneca, the hotels are gone, and the resident headcount has fallen below 50. For groceries, Senecans have to drive 11 miles to Mullen, or 15 to Thedford in the opposite direction. There is still one church and the Cattleman’s Restaurant and Lounge, where Ruth Andersen, a widow and retired schoolteacher, makes a habit of lunching at noon. I missed her, passing through, but reached her later by telephone to ask why Seneca’s District 6 grade school sits shut down and crumbling at the edge of town, like an echo of that ghost motel back in Kansas, skulking at the Center of the USA.

You can’t have a school if there aren’t enough children, Ruth Andersen said. And you won’t have enough children if the younger people have to go away to find work and never come back to raise a family. And then she said something I had already heard in one form or another along my way across the Plains, and would hear yet again. “When you lose the school,” Ruth Andersen said, “you’ve lost the town.”

THOUGH CATTLE RANCHING plays a huge role in the rural economy of the Great Plains, especially in the westernmost sections (and in the Sand Hills), the glue that holds the overall region together is the farm. Corn, wheat,

THE GREAT PLAINS

Formed of fertile sediments washed from the eroding Rocky Mountains, the Great Plains for eons were rolling grasslands covering a vast swath of the continent's mid-section. Today they're a sea of crops and cattle range.

In the U.S. the Plains produce half the nation's wheat and 60 percent of its beef. With a farm population of less than half a million, it's one of the most sparsely populated agricultural areas on Earth.



DRY LAND

A black blizzard engulfs Hugoton, Kansas, during the Dust Bowl days of the 1930s, when drought, low crop prices, and plowing-induced soil erosion uprooted 2.5 million refugees. Withering multiyear droughts returned in the 1950s, 1980s, and 1990s.

Mean annual precipitation (Inches per year)

30.1 to 35	15.1 to 20
25.1 to 30	10.1 to 15
20.1 to 25	

FLUID BOUNDARY

The Great Plains end at the Rocky Mountains, but where they begin in the east is a point of debate. Some draw the line at the 100th meridian, where annual precipitation averages 25 inches or less. West of that, said John Wesley Powell, the federal scientist tasked with evaluating the "Arid Region" in the 1870s, unirrigated farms are doomed to fail.

NO MAN'S LAND MUSEUM, GOODWELL, OKLAHOMA (ABOVE); INSTITUTE FOR REGIONAL STUDIES, FARGO (ABOVE RIGHT)



POPULATION DRAIN

Armed with a steel plow and steam tractor, a North Dakota farmer turns prairie into wheat field during the "great plow-up." Between 1909 and 1929, farmers flocked to the region and broke 32 million acres of sod. Increasing mechanization and farm consolidation have driven people off the rural Plains ever since. Though cities have grown and prospered, the farm population is less than an eighth what it was in 1930.

Percent change in county population, 1990 to 2000

-42.3 to -10.0	13.2 to 24.9
-9.9 to -0.1	25.0 to 49.9
0 to 13.1	50.0 to 191.0

POPULATION DATA SOURCE: U.S. CENSUS BUREAU

soybeans, grain sorghum are the major crops; alfalfa, some places; barley and sugar beets too. Unlike the native prairie grasses they have replaced, these are annual crops that, for the most part, are sown and reaped each year by big fuel-gulping machines, pampered with pesticides, pumped up with chemical fertilizers, and all too often irrigated expensively from a shrinking supply of groundwater needed to replace what fails to fall from the sky. As always, there's the weather.

The weather wasn't especially kind to the Plains at the dawn of the new millennium. Drought swept the region from Montana and the Dakotas south into Texas and eastern New Mexico. The High Plains of eastern Colorado turned to powder. Backhoes and bulldozers were summoned to clear county roads of windblown dirt. Farmers greeted each morning with the same wry wisdom: "Well, we're sure enough one day closer to rain." But in some places the rain would not come for months—and then too late in the season to do any good. Newspapers proclaimed 2002 the driest year since the Dust Bowl of the 1930s; in parts of the northern Plains the year was the driest in a century. So the pumps and windmills and center-pivot sprinklers sucked at the earth ever more urgently. Under the Panhandle Plains, the level of the great Ogallala aquifer plummeted closer to depletion.

A few Plains precincts began to green up last year, thanks to a salubrious dose of winter and spring precipitation. In South Dakota wheat rebounded from the devastating losses of the year before. And in parts of Kansas the corn in July would soon be as high as an elephant's eye.

I could almost *hear* the corn growing as I drove across the Smoky Hill River south of Salina to call on a man who believes he's found a way to stop the chemical contamination of the countryside, reduce the farmer's dependence on fossil fuel, and drop aquifer depletion and soil erosion to zero. How? By creating an agriculture as sustainable as the grasses that flourished here, before the plow, for a million years.

Wes Jackson is the founding father of the Land Institute, a project he launched back in 1976 to develop an ecological approach to agriculture—growing mixed perennial crops in unplowed fields and allowing only sunlight and rain to bring them to harvest. Jackson holds a doctorate in genetics, and his revolutionary idea

and its ongoing execution won him a MacArthur "genius" grant in 1992.

In the living room of the farmhouse that serves as his office, we sat that afternoon and talked about his work and his fundamental beliefs. "Ten thousand years ago," he said, "the terrestrial parts of the Earth featured, almost everywhere, perennials in mixtures. Then humans introduced an agronomic program that began the journey of reversing that."

Jackson's method is to work on what he calls the genomic architecture of a plant, nudging some of the wild perennials, such as the Illinois bundleflower, toward domesticity, and pushing some domestic annuals, such as corn and wheat, in the other direction. After years of incremental change, the annuals will be transformed into bona fide perennials.

"If you want quick, cut-rate science," he said,

ON HIS OWN, *retired rancher Albert Shaw walks what's left of the main street in Roy, New Mexico. Forty percent of the population of 304 is over 60. "We're dying down," says Annette Esquibel, a lifelong resident who runs a local café. "I'd like to leave someday. Find something better."*



The region has been experiencing a



culture shock unlike any since the Depression.

CALVIN COOLIDGE stopped here in 1927 when Ardmore, South Dakota, was deemed worthy of a presidential visit. The town survived the Great Depression without one family on federal relief. Today it's just another ghost town on the Plains.

FALL RIVER COUNTY, SOUTH DAKOTA

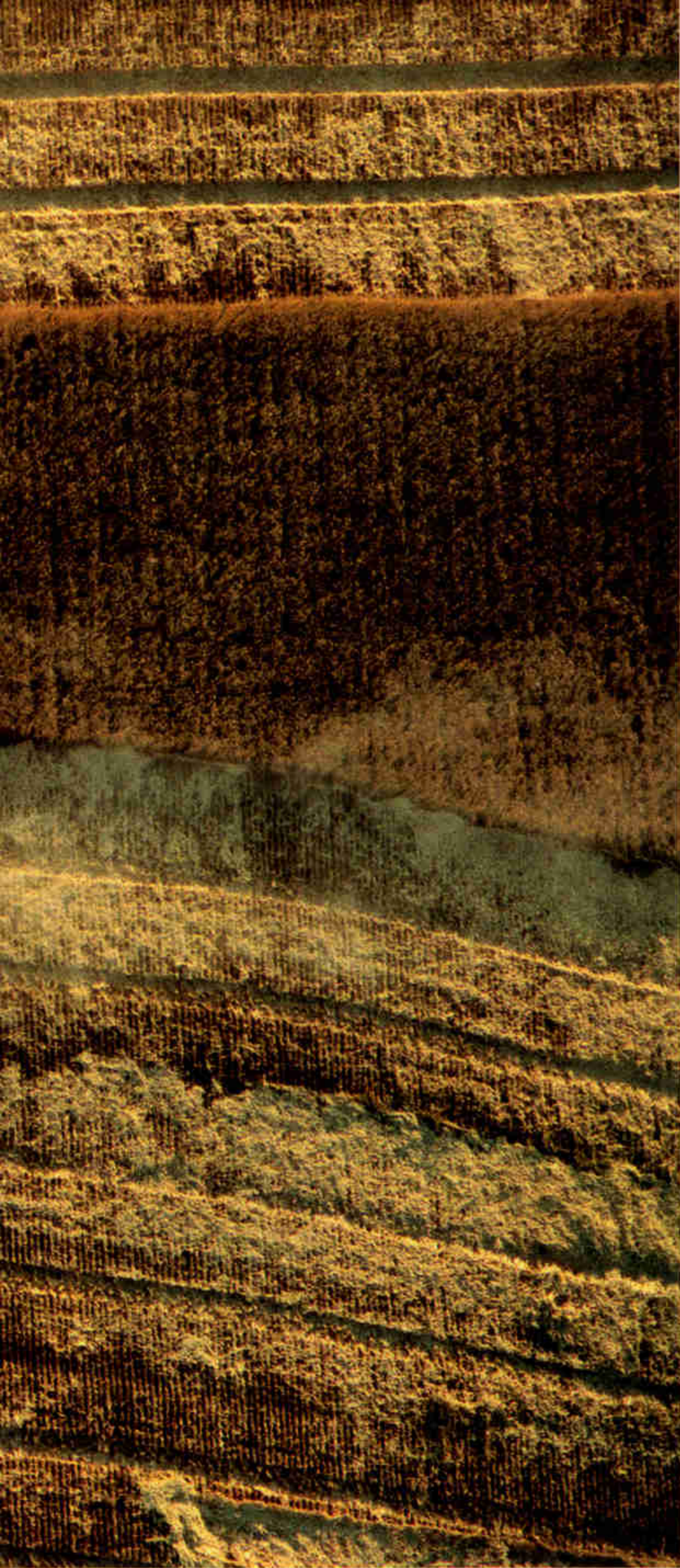




“this isn’t for you, because it’s going to take decades to shuffle the chromosomes. Oh, we’ll have something promising in 25 years that will energize us. Sorghum and wheat will come first, corn and soybeans later. But we’ll need people who can commit to long time frames, people with the ability to set up results they won’t even see in their lifetimes.”

Long time frames might be tolerable in the venue of a greenhouse, but they are unlikely to catch on out in the fields where Great Plains farmers toil for their daily bread. While the big

corporate farms rake in the lion’s share of federal subsidies, and often turn a profit, the family farm is still a place of long hours, large debts, and small returns. The old days of making do with a couple of mules on 160 acres have been replaced by an era of exponentially expanding needs—more than a thousand acres per farm, on average, and a fleet of machines valued at half a million dollars. “It’s sad,” a retired dryland farmer in Oklahoma said to me one day. “There’s just no way a young person can farm nowadays—even if he wanted to.”



THOMAS COUNTY, KANSAS

HIGH-TECH HARVESTERS *capable of reaping 200 acres a day devour a field of winter wheat in the old Dust Bowl region of Kansas. Federal farm policies dating from the 1930s, rising operating costs, and the loss of local markets have forced farmers to get big or get out, pushing thousands of families off the land.*

1949 and promptly shocked neighboring cowmen by making his spread a wildlife sanctuary where coyotes—anathema to most ranchers—would be left unmolested, and the no-kill policy would even be extended to prairie dogs and rattlesnakes. “I like to sit back and let nature do the work,” Tom Lasater was fond of saying after making his mark as a breeder of top-grade grass-fed cattle. “She’s a hell of a lot smarter at it than we are.” Now Tom’s son carries on as managing partner of the family ranch.

On a brilliant blue-sky day last June, Dale Lasater ushered me to a dusty vehicle, and we headed out to see how smartly nature was working the ranch for him. It turned out she’d been doing all right, of late. There had been snow in the mountains and good spring rains, and now the grama and switchgrass were coming up green and thick on the range to the north side of Big Sandy Creek. “Looks like we’re making a comeback,” Lasater said, referring to the four-year drought that had forced some other ranchers roundabout to sell off their stock.

Lasater is a friendly, soft-spoken man, a Princeton graduate who spent two years in the Peace Corps working to improve ranching practices in Colombia. We pulled over and walked to a water trough hooked to a windmill, and I was not surprised to hear him confess that it takes more than nature to maintain equilibrium between having good grass and growing healthy cattle. He said, “We used to think the answer was balancing the number of animals with the number of acres. But that turned out to be the problem—continuous grazing in the same place. Timing is the critical factor, with a long rest for the grass. If you keep the cows moving like the bison kept moving, then the grassland has a chance to sustain its natural diversity.”

The formula works like this: With electric wires for fencing, Lasater can stock a pasture with cattle for seven to ten days of grazing, then rotate the animals into the next pasture, and a

ABOUT 350 MILES WEST OF SALINA, in the rain shadow of Colorado’s Rocky Mountains, a notion not altogether unlike Wes Jackson’s promises to challenge the wisdom of ranching beef cattle in conventional ways. The idea is to manage the range as if it were wild, and cattle as if they were bison. One cowman who stands behind this idea is Dale Lasater.

Lasaters go way back in the ranching business, back to the 19th-century time and place of the Texas longhorns. Tom Lasater, Dale’s father, brought a herd north to eastern Colorado in



succession of pastures after that, in order to give each pasture in turn an 80-day rest, or such time as its mixed grasses may need to regenerate. A Lasater animal will never see the inside of a feedlot or taste corn.

In addition to selling live cattle, Lasater now successfully markets cuts of organic beef by website mail order, as well as directly to retail stores. Before I left the ranch that day, I got a taste of Lasater's grass—transmogrified into a free-range filet, stove-topped to perfection by the cowman himself. His promotional literature has it right: "Lasater Grasslands Beef. . . . Dry aged 14 to 21 days for that old-fashioned flavor."

THE PEOPLE OF THE PLAINS have a warm affinity for the past, perhaps to an extent greater than that of regional folk anywhere in the United States outside the Old South. It isn't exactly history that excites them, for much of that—and especially the darker side—tends to get pinched in the plainsmen's fervor to celebrate

cutout of George Armstrong Custer that will serve as a target for arrows, the bright, bobbing balloons that will burst—*pop! pop!*—as the horsemen gallop hell-for-leather among them with their .45-caliber revolvers.

It was Walter Prescott Webb (he of 98th meridian fame) who historically enshrined the Colt revolver as the firearm that "won" the West, while others tipped their hats to the Winchester rifle. But a third weapon may have played a more significant role in the taming: the Sharps rifle, which in a few short years destroyed a commissary of bison that had clothed and sheltered and fed the Plains tribes for generations. A market for buffalo robes had gone big-time in the 1840s. Then as railroads crossed the Plains in the '70s, and tanners back East and in Europe found a way to turn bison skins into industrial leather, the slaughter toppled the herds to a precious few. One buffalo hunter claimed that in 1875 the Indian-fighting Lt. Gen. Phil Sheridan told the Texas legislature that buffalo hunters were

ARMLOADS OF PUPPIES *enthrall a young North Dakota boy who is growing up with a pony too, but no TV. "I just want my kids to appreciate what we had," says his mother, Theresa Sund, whose husband and father work organic farms near Medina. Over much of the Plains, however, farm families continue to lose their most important crop—the next generation of farmers. The ruins of a homesteader's cabin in New Mexico lie in a county with less than one person per square mile, a density akin to Greenland.*



HARDING COUNTY, NEW MEXICO


the rodeos, stampedes, and mythic reenactments that perennially stoke their collective psyche. Call it nostalgia for times gone by, or for times that might never have been exactly as grand as people would paint them.

Let us go now to Sturgis, South Dakota, where the banners above Main Street welcome us to that popular annual event called Cavalry Days. Out on the grounds at Fort Meade we can see the reenactors dressed in their Seventh Cavalry blues, the Sioux resplendent in feathers and buckskin, the tepees and the canvas tents, the

doing more "to settle the vexed Indian question than the entire regular army. . . . for the sake of a lasting peace let them kill, skin, and sell until the buffaloes are exterminated. Then your prairies can be covered with speckled cattle, and the festive cowboy, who follows the hunter as the second forerunner of an advanced civilization."

Sheridan would have his way. Soon bone collectors gathered up the sun-bleached buffalo skeletons and shipped them east to be ground into phosphate fertilizer to sweeten the soil of the onrushing corn belt. With bison virtually

This was the Garden of the World



AMBER WAVES OF PLAIN roll across Nebraska's Sand Hills, where grasses such as prairie sand reed anchor the ancient dunes. With most of the plants' biomass underground, such virgin prairie can weather drought, fire, and floods—but not plows.

GRANT COUNTY, NEBRASKA

where the rain would surely follow the plow.



"When you lose the school,"

out of the way (barely a thousand would survive to 1900), and Native Americans incarcerated on their parched reservations, festive Texans could indeed move their speckled longhorns—by the millions—north to the Plains. There was nothing to stop the homesteaders either, now that they had barbed wire to fence out the cows and steel plows that would tear up the sod and open the erosive earth to the grasping wind. Besides, the railroads, wanting to people the Plains in order to profit from hauling their freight, promised an Eden. This wasn't the Great American Desert the early scouts had described. This was the Garden of the World, where the rain would surely follow the plow.

Settlers clearly embraced that myth in Cimarron County at the western tip of the Oklahoma Panhandle. In 1926 in Boise City, the county seat, a farm machinery dealer was able

to sell new tractors at the rate of five a month, and he wasn't the only smiling salesman in that little town. Over the next few years annual precipitation would average 19 inches, two above normal; the acreage planted in wheat would double, and by 1931 the bountiful harvest was averaging better than 21 bushels an acre. Back east, the Great Depression had the jobless stacked up in soup lines, but not in Cimarron County. Then, under bluebonnet skies, annual rainfall began to slide down through the lower teens. In Boise City, gauges failed to record even nine scant inches for 1934. The crops failed, and in came the dust.

The first of the big dusters would miss Oklahoma. It rolled out of the northern Plains in May of '34 and powdered Chicago with 12 million tons of Wyoming and Montana dirt. A day or so later the fallout dirtied the rooftops of

New York City and the decks of ships a hundred miles at sea. But Cimarron County and the rest of the southern Plains would be next. And no one who was there to experience Black Sunday, April 14, 1935, would ever forget it.

Norma Gene Butterbaugh Young was ten that spring. She remembers playing in the front yard of her parents' home in Boise City on a beautiful sunny day, when she looked up and saw a strange cloud on the horizon. "I'd never seen a cloud like that," she recalls. "It was so big and so black. So I ran in the house, and in a little bit that thing struck, and you couldn't see anything. It was just as black as night. And Granddad came up from the basement and yelled at

Mother, 'Why don't you turn on the lights?' But she already had. Oh, it was terrible!"

Norma Gene still lives in Boise City, long retired from editing the weekly newspaper her father had acquired in the 1920s. She and the other Dust Bowl survivors of Cimarron County don't quite fit the popular image of the Okies who, as John Steinbeck told it, dusted themselves off and fled to California to pick the grapes of wrath. Many people, it turned out, stayed.

"It takes a certain kind of person to live out here," Phyllis Randolph was saying in her office



CARTER COUNTY, MONTANA

DOUBLE DUTY, fourth grader Chantz Lambert, at left, and third grader Seth Price raise the flag over the one-room Hawks Home school in eastern Montana. With only six students and no more on the horizon, the school may close in a few years. Dusty roads link scattered towns on Colorado's High Plains (opposite), where land is often measured in square miles instead of acres. Still, "communities here are very tight," says one resident, whose nearest neighbor is a mile away.

said a retired teacher, “you’ve lost the town.”

as director of the Cimarron Heritage Center in Boise City. “People here are known for their stubbornness and contrariness,” she said. “It runs with the land.”

IF THERE WAS ANY SURPRISE in the findings of the 2000 U.S. census, it wasn’t so much the loss of population from half the counties in the Great Plains; those numbers had been ebbing for decades. The surprise was the disproportionate gain in counties that contain the region’s Indian reservations, a growth that could not be pegged entirely to higher birth-rates, better health care, casino jobs, and the availability of federally subsidized housing. Thousands of Native Americans long off the “rez”—Blackfeet, Crow, Flathead, Northern Cheyenne, Sioux—were putting the white man’s cities behind them and heading for home. “A lot of these people returning from the cities are retirees,” says Fred DuBray, a Sioux who manages the InterTribal Bison Cooperative near the Black Hills. “This is where they want to be. This is where their heart is.”

The heaviest surge of reverse migration has occurred on the Pine Ridge Reservation in South Dakota, home of the Oglala Lakota people and already the most populous of the many reservations scattered across the Great Plains. Though tribal and federal officials disagree on the Pine Ridge numbers, Shannon County, where most of the Oglala Lakota live, registered a gain of 26 percent in the 2000 census, second highest for ten-year growth in the entire state.

One day at Kyle, a Lakota community northeast of Wounded Knee, I spoke with Ivan Sorbel, a Sioux who came home to Indian Country after four years at out-of-state colleges and six in the U.S. Marine Corps. Sorbel works with the Pine Ridge Chamber of Commerce to promote small, entrepreneurial businesses on the reservation as an alternative to government handouts. “What we’re trying to do,” he said, “is get away from selling poverty.” But it won’t be easy. Unemployment on the reservation still runs 60 to 80 percent, with all the attendant

problems of substance abuse and short lives.

One prospect that Sorbel finds encouraging would capitalize on the tribe’s proximity to vacation destinations such as the Black Hills and Badlands National Park. Already the Lakota are promoting a kind of tourism that celebrates “living” tribal culture. Reenactors need not apply.

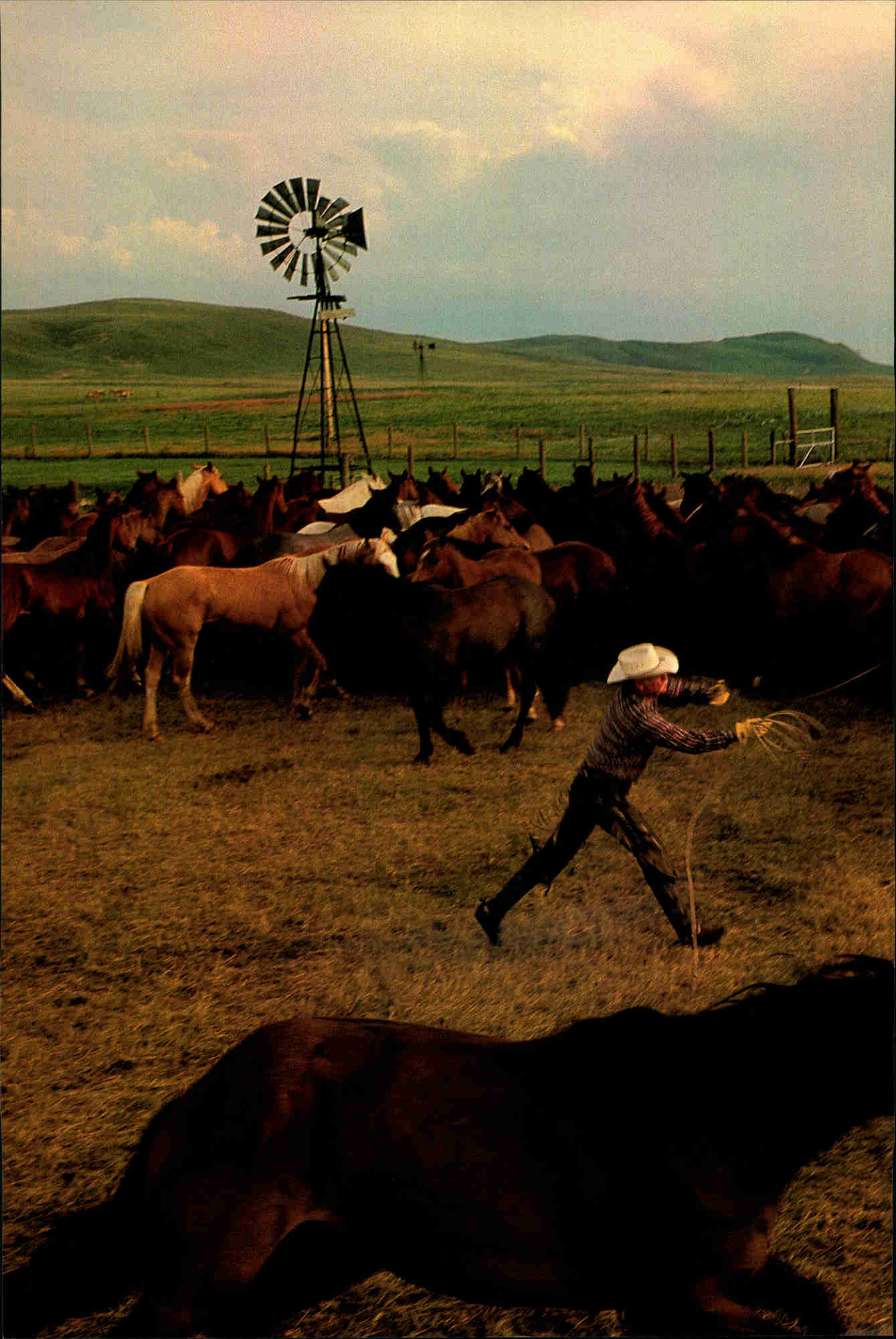
Tourism is occasionally touted as an economic panacea not only for the reservation but for the region as well, as if frigid winters, sizzling summers, constant wind, and a paucity of traveler services were mere inconveniences, easily tolerated in the pursuit of all this glorious open space. Yet however devoutly some folks might wish the Plains to develop a recreation-based economy, the safer bet is on those who say it will never happen. So what are the alternatives?

Manufacturers, apart from meatpackers and other food processors, have never found the



WELD COUNTY, COLORADO

Plains an attractive region for doing business, at least relative to the rest of the country. Most of the cities at the edge of the Plains have a healthy and diversified industrial base, but such a base is not to be found in the remote areas that need the jobs. The energy sector might provide some new jobs, but beyond that there are few real prospects unless innovative technologies can be fashioned to develop new products from the region’s agricultural bounty. Outside Omaha, for example, a high-tech plant now processes corn into synthetic fibers that can be



COWBOYS RULE *the Haythorn ranch, where fourth-generation horse breeder Craig Haythorn ropes mounts for his men during branding. "It's all I ever wanted to do," says Haythorn, whose horses sell for \$3,500 to \$50,000 each.*

ARTHUR COUNTY, NEBRASKA





used in a variety of products, from diapers to upholstery. The plant employs a hundred people. But Omaha is not on the Great Plains—and is not suffering from out-migration.

Once upon a time, say about 10 to 20 years ago, as the information age flexed its modems and suburban sprawl began to frazzle the human spirit, some demographers predicted that rural communities would soon experience a reverse migration. Educated urban white-collar types, sick of it all and no longer bound to a downtown office, would simply pack up their computers and fax machines and relocate to some quiet, inexpensive hamlet way out in the boonies. Working electronically from their new homes, the migrants would invigorate places like—who knows?—Lebanon, Kansas, or Seneca, Nebraska. And all would be well with the world, except for one thing.

“It never happened,” said Jim Hoy, “because most people are social animals.” A Kansas cowman turned college professor, Hoy is director of the Center for Great Plains Studies at Emporia State University. We were spending a sociable afternoon talking about some of the great books, such as Willa Cather’s, that the Plains had inspired, and suddenly we were into this other subject—about why the miracle of the modem had failed to repopulate the Plains. “At work or play, people like to be with people,” he said. “It’s not much fun to gather around the water cooler if you’re the only one there.”

In Congress there was talk last year of a New Homestead Act to give the rural economy a shot in the arm. Introduced in the Senate by Byron Dorgan, Democrat of North Dakota, and Chuck Hagel, Republican of Nebraska, the measure would establish a three-billion-dollar venture capital fund and provide generous tax credits to

businesses willing to locate or expand in counties with high rates of out-migration. Though the bill failed to pass, it was reintroduced this year and is pending in committee.

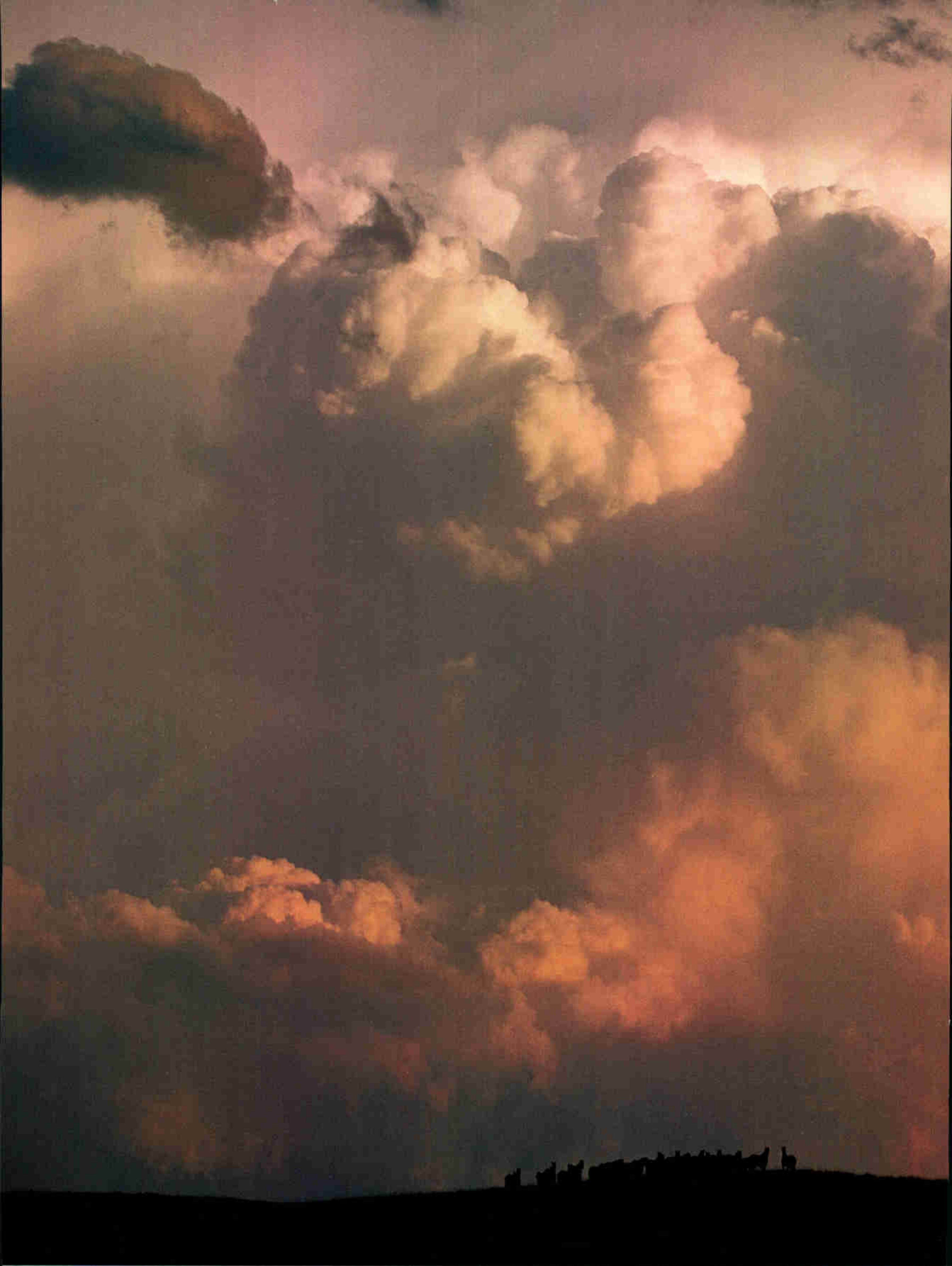
No doubt in the long run it will take more than an act of Congress to lift the prevailing melancholy from the region’s rural communities. For even if ways can be found to stanch the rate of out-migration and throw open the shuttered windows of commerce on Main Street, the fields and pastures beyond will need some mending too. There are limits to what the land can yield.

A generation ago, in his classic account of the Dust Bowl tragedy, historian Donald Worster warned that U.S. agriculture must not “repeat all the old mistakes of over-expansion” and ignore the lessons of the 1930s. “The Great Plains,” he wrote, “cannot be pushed and pushed to feed the world’s growing appetite . . . without collapsing at last into a sterile desert.”

In an effort to avoid “the old mistakes,” a number of American farmers have been turning to more sustainable practices such as crop rotation and conservation tillage, which in some cases can mean no tillage at all. Others are retiring some of their acres into the federal Conservation Reserve Program, which pays the

GIVING THANKS *to the buffalo for its meat and spirit, Jay Red Hawk, a Dakota Indian, celebrates wichohan washte—the good way of life—after the first traditional buffalo hunt in his family in generations. Bison fed the Dakota for centuries; annual grains—dependent on fossil fuels—won’t do the same, says geneticist Wes Jackson, examining Indian grass at right. By crossing deep-rooted native perennials with annual crops, Jackson hopes to forge a sustainable agriculture.*





"Between that earth and



ARTHUR COUNTY, NEBRASKA

that sky I felt erased, blotted out.” —WILLA CATHER



farmer to maintain those acres as grassland. In fact, grass appears to be staging a comeback on some public lands too. Fifteen national grasslands embracing more than three and a half million acres are scattered across the Great Plains from North Dakota into Texas—a legacy acquired by the government after bankruptcies and foreclosures evicted thousands of unlucky homesteaders in the 1930s. It's enough to make a person wonder: When grass returns to the Great Plains, can buffalo be far behind?

Since a small herd of bison was protected in Yellowstone National Park in 1894, these large, shaggy ruminants have multiplied and increased across the land until their numbers now exceed a quarter million nationwide. A consortium of Native Americans now manages bison herds totaling 12,000 head, mostly in the Dakotas and Montana. Ted Turner runs 37,000 bison on 13 of his ranches (1.8 million acres) in six of the Great Plains states and has launched a chain of restaurants called Ted's Montana Grill. The

EVERYBODY WINS *at the Duck Pond, one of the homegrown attractions that keep people coming to the community-owned carnival in Oberlin, Kansas. Staffed by volunteers, the one-week event draws tourists but also brings residents together, says Jane Carlisle (left), who has worked a booth for the past 16 years. "It's sort of a pride thing." Despite tough times, hard work and resilience remain as rooted to the Plains as the windmills on a Nebraska ranch, spinning now with the winds of change.*

media mogul and philanthropist aims to whet a public taste for the low-fat bison burger.

Rustle up thousands of free-range bison across millions of acres of native grass and what else might you have besides burgers? You have a sweeping perception of what the Great Plains used to be—and might in some ways be again. You have the "Buffalo Commons," a provocative vision first laid out in 1987 by Frank Popper, an urban studies professor at Rutgers University, and his wife, Deborah, a geographer at the College of Staten Island. The Poppers found that by

BLEEDING HEARTLAND More and more people are being pushed off the Plains. Can the trend be reversed? Share your thoughts in our forum—plus experience the sights and sounds of the Great Plains—at nationalgeographic.com/magazine/0405.

leaving the shape of their Commons somewhat ambiguous, people began thinking and talking about long-term ecological and economic restoration of the Great Plains. To them, the Commons became a metaphor for using the land with a lighter touch, although in their initial proposal they did recommend that the federal government acquire "more and more" private land. Some farmers and ranchers saw it as a scheme to get them off the land and turn the region into some kind of mega-national park. Tempers flared, and in at least one Plains community, a scheduled appearance by the Poppers had to be cancelled in the interest of public safety.

Time has cooled most of those tempers, especially in the northern Plains, where local banks are helping many ranchers switch from cattle



SIoux COUNTY, NEBRASKA

to bison. Moreover, a number of conservation organizations, including the Nature Conservancy, have been buying up farms and ranches and, if not stocking them with bison, managing them for their intrinsic value as wildlife habitat. The Commons is catching on.

"I guess some things are beginning to change," that Kansas visionary Wes Jackson allowed one day. And how's that? "Well, heck," he said. "I hear the Poppers can come out here now and won't even need the sheriff for escort when it's time to leave town." □



Pulling T O G

The first railroad missed Cuba by several miles. So local leaders simply moved the town. Ever since its beginnings in the 1860s, the tiny Kansas farming town has been doing whatever it takes to hold its ground. Raised nearby, Jim Richardson has photographed Cuba for the past three decades, drawn to a community with no quit in it.

A storm sky hurries the cutting of wheat (above). At the Harvest Festival, the Benyshek brothers (right) strain to win the sled-pulling event. 1977; 1979



THE GREAT PLAINS | PART 2

ETHER

30 Years in the Life of CUBA, KANSAS



TEXT AND PHOTOGRAPHS
BY JIM RICHARDSON

EVERY TIME I HEADED BACK to Cuba, I was afraid the town would be gone.

Driving across the dusty Kansas plains, down ever narrowing roads, past derelict towns and forsaken farms, I feared that Cuba might have gone the way of so many other once vital places on the Great Plains, drained of people, businesses, and hope. Like others whose heartstrings are tethered to a small-town past, I wanted to believe that our rural towns and villages—places we cloak in myths of goodness and simplicity—could somehow survive.

simplicity—could somehow survive.

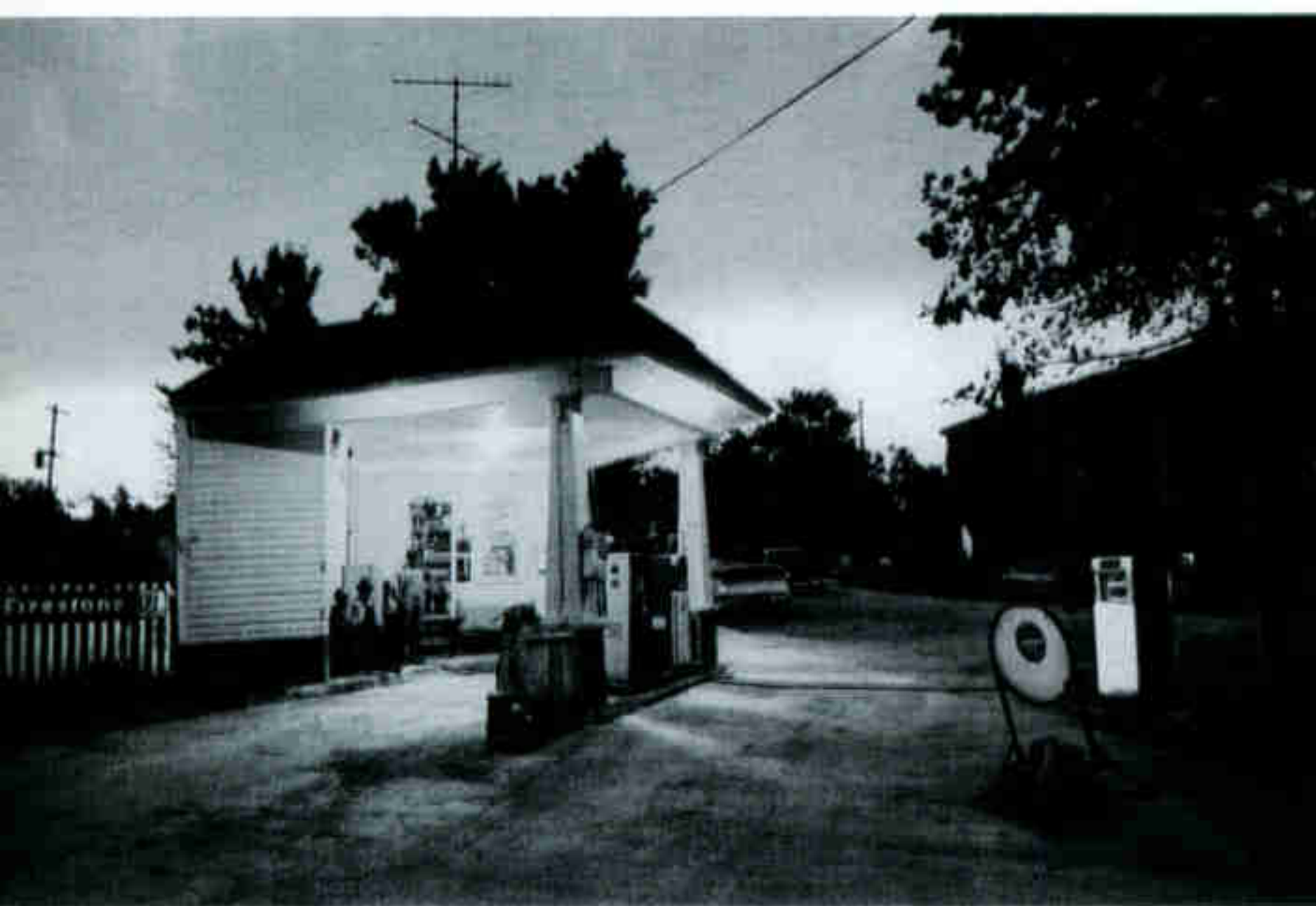
All of us have a place we think of as “our town.” Cuba, Kansas—15 miles from the farm near Belleville where I grew up—is mine. As far as I can tell, the town, founded in 1868 by farmers moving westward after the Civil War, was named Cuba after a visitor who’d traveled to the Caribbean island passed through the area. He apparently entranced the settlers with tales of Cubans fighting the Spanish for freedom, a story that must have resonated with the early townspeople, including Czech-speaking immigrants from

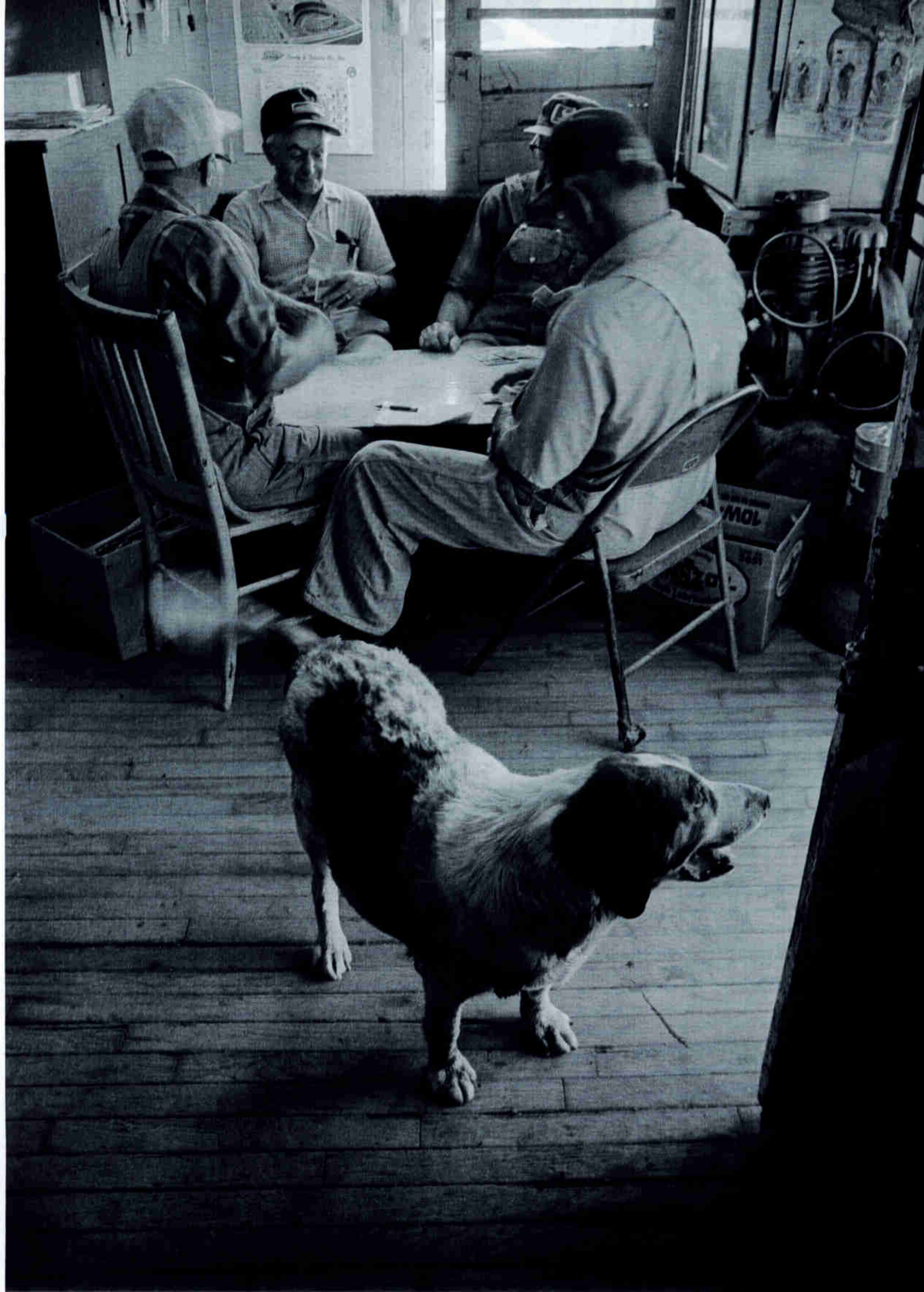
Bohemia—a region then under Austria’s thumb—who came here in the 1870s.

I first made Cuba’s acquaintance in the mid-1970s as a young photojournalist who wanted to document small-town America before it was gone. Cuba seemed a ripe subject, a town of fewer than 300 people surrounded by dryland wheat farms that surely the next drought or economic crisis would send to its doom.

I have seen the schools and farms of my childhood vanish, and towns wither away and die of abandonment as people left seeking work or excitement. That’s why every time I went back to Cuba, the dread of loss traveled with me. But whenever I turned the corner onto its main street, Cuba was still there, with its silver water tower, wide gravel streets, and community hall—and in the center of it all, Wes Klima’s gas station. What a relief to find his place full of men playing cards, perfecting their jokes and tall tales beneath girly pinups on the walls.

Cuba taught me the recipe for community. It’s all about people—because that’s really the only thing Cuba has going for it. Every death, birth, departure, and arrival marks an important occasion. Just the other night, I found Curtis Trecek in the café with family and friends. Curtis wasn’t even born when I started coming here, and now he was going off to the war in Iraq. I hadn’t intended to shoot any pictures, but I couldn’t resist. It’s been that way for 30 years.





Wes Klima's gas station (left) always welcomed me like a lighthouse on a prairie sea. I knew I'd find the town's cardplayers inside—and, of course, Nixon the dog.

1980



1975

Walking has always been the best way to get around Cuba. Today this tree—and many of these stores—are history.



Thirty years is tough on a town. The hardware
and feed stores, the barbershop, the liquor store,
the lumberyard—they're all gone.



Ritual and Routine



When I asked Betty Klaumann what she was doing, she said, "taking my geese to where the grasshoppers are good."
1975

TIME CAN TAKE A TOLL on small, out-of-the-way towns like Cuba. Long ago trim, freshly painted houses lined the streets. Farmers had money in their pockets and spent it in the town's stores. Two railroads brought trains to town, and on Saturday night the place was hopping. Even Lawrence Welk and his band came here. Today hardly anybody finds his way to Cuba. The trains are gone, many of the old houses are vacant, and farmers are scarce, victims of drought and low prices.

Most casual visitors will swear time has stopped dead, that the only thing growing faster than the wheat is boredom. They're wrong, just as I was when I first came



Fitted out in overalls and seed hats, farmers wait for the tools to go on sale at an estate auction.

1981

barreling into town. One summer day I found Betty Klaumann taking delight in her geese (they shouldn't have trusted her; she ate them every year). The sight of a farm-wife waltzing with her geese reset my mental clock to another era. Since that moment I have relished the rhythms of Cuba. When a baseball game was rained out, people stayed and watched the storm. When the weather turned bad, farmers crowded into the Lazy B Bar. When business was slow, barber Charles "Andy" Andrews talked on his ham radio till the next haircut showed up. Yes, there is a sameness to many days, but that sameness becomes ritual, which makes each day part of a satisfying whole.



A Good Day's Work

Mayor Larry Hinkle, at right, convinced fellow citizens to help him pour a sidewalk, all for a couple of beers.

1977



Nightlife during the fall harvest revolves around the grain elevator, where trucks unload their dusty cargo.

1985

SINCE THE TOWN'S FOUNDING, farming has been the backbone of Cuba's economy. But try finding many farmers anymore. Agricultural efficiency is a killer of small towns: Bigger farms mean fewer farmers, fewer children, fewer schools, fewer stores. Gone and missed are the Lazy B Bar, the implement dealer, the Mustang Inn. But the work of the town goes on. Some families stay, a few retirees move in, and new shops open. The TV repair shop/beauty parlor is reborn as a café, and the Mustang Inn becomes an antiques market. It helps that citizens wear many hats. City officials teach or hang drywall, and, if needed, build a sidewalk by the Legion Hall.



Owner of the lumberyard, Frank "Junior" Hostinsky swore that his '51 Chevy would be valuable someday.

1984

Conductor Elmer Dolezal, the town plumber, waits for his cue to strike up "The Star-Spangled Banner."



The Cuba City Band needed a tuba,
so I bought one and learned to play the polkas
and waltzes that the town loves.





Jeannine Kopsa makes a fuss over Wes Klima, pinning a flower on one of Cuba's prize citizens.

1977

Inventing Fun



Frank Trecek, left, and Ernie Tuma rock and rib at the winter Rock-A-Thon charity event.

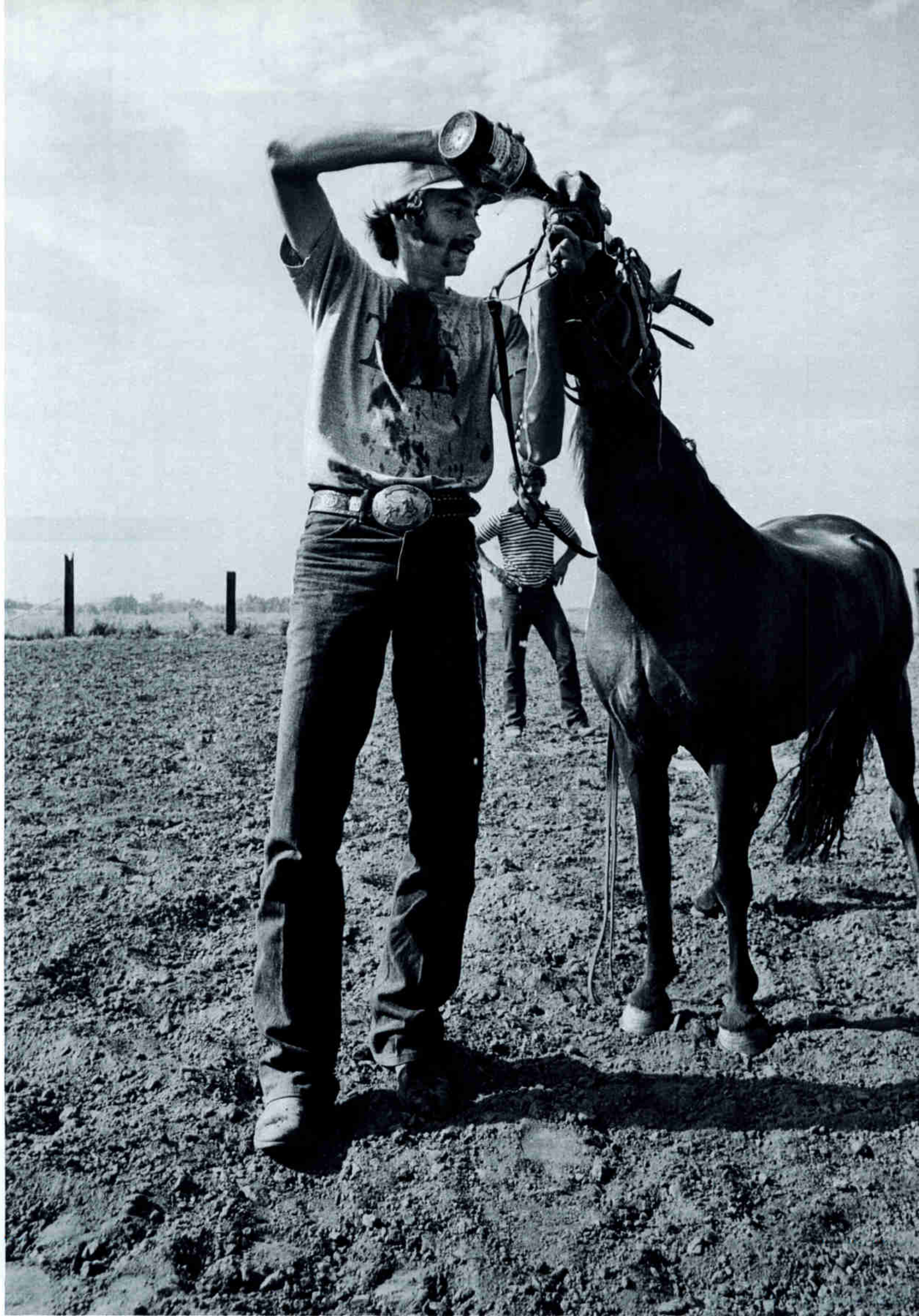
1985



Jeremiah Bunch proudly displays the slick amphibian he entered in the Frogtona 500 race.

2000

"IF WE GAVE PRIZES for bizarre behavior, you'd have to hand out an awful lot of them," Jeannine Kopsa, one of the town's tireless festival planners, once said. There are frog races, blindfolded lawn mower sprints, and ladies' cow-chip-throwing contests. Making up fun is a necessity in a place 80 miles from the closest mall. When I first came, all ages flowed in and out of the bars where old folks showed off by ordering beer (*pivo!*) in Czech. The Czech Club met in the old Mustang Inn to sing, but now it's younger folks belting out karaoke tunes at the new café. Kids ride bikes, hold car washes, and watch high school football—thankful there's still a school to cheer for.



It's a Cuba thing: Ride to a marker, chug a quart of beer, race back. Allen Talbert thinks his steed deserves a taste too.

1977

1976

The Baxa family doesn't need the hymnbook to sing along during Mass at St. Isidore Catholic Church.



Cuba has two churches, Catholic and Presbyterian. They're part of the glue that keeps the community together.





All the town widows can count on a visit and a bag of candy from Dale Chizek in his Easter Bunny whites.
2000

Giving Back



The Reverend Karen Kokles offered counsel and comfort during her years as pastor at the Presbyterian church.

1982



On his final day of work, Dr. C. W. McClaskey treated an old pal, Emil Makalous.

1981

EVERYBODY NEEDS SOMEONE to lean on, and in a place with so few people, some folks stand out. The Chizek cousins make house calls as the Easter Bunny and Santa Claus, cheering up the elderly. At the gas station, whenever Wes fell sick, his cardplaying pals worked the pumps and put the money in his desk. And then there was Doc, or as the license on his wall said, Dr. C. W. McClaskey. Arriving in 1929, Doc did everything from delivering babies—one in his office doorway—to giving generations of students free sports physicals. He loved to gossip and watch baseball on the waiting room TV, but mostly he loved making people feel better.

ON THE 50TH ANNIVERSARY of Doc's arrival, the town dedicated its Harvest Festival to him. Kids dressed up like Doc, paunchy with pillows under their clothes, and parade floats carried multigenerational gatherings of "Doc's babies," just a sampling of the 700 he delivered. That evening I asked the "babies" in attendance to come forward for a portrait with Doc. It felt like a revival meeting with all these folks standing up to give praise. Two years later Doc retired; two months after that, he died. The town knows that it's next to impossible to attract another full-time doctor. Now the nearest physician is ten miles away.



Doc McClaskey poses with just a fraction of the people he's known from their very first breath.
1979



Mourners carry Doc McClaskey's casket to his grave.
1981

Leaving a Mark



Pinned with gift money and fortified with beer, Connie and Einer Schou celebrate their wedding.

1980



Connie and Einer Schou take pride in the children and crops they raised.

2000

THERE'S A MESSAGE behind the baby contests and the matchmaking that goes on in Cuba: Towns die without children. That's why locals inspect each crop of kids for the spark that will keep Cuba alive. Einer Schou has that spark, a twinkle in his eye and devil in the grin. Einer was a young person who was determined to stay and farm. I first saw that grin when, as a teenager, he tried to ride a horse into the Mustang Inn. I saw it again when Einer danced with his new bride, Connie. They had grown up on neighboring farms, thrown together by matchmaking sisters. And when Einer thinks his son, Wes, might stay to work the farm, I see that grin again.

2002

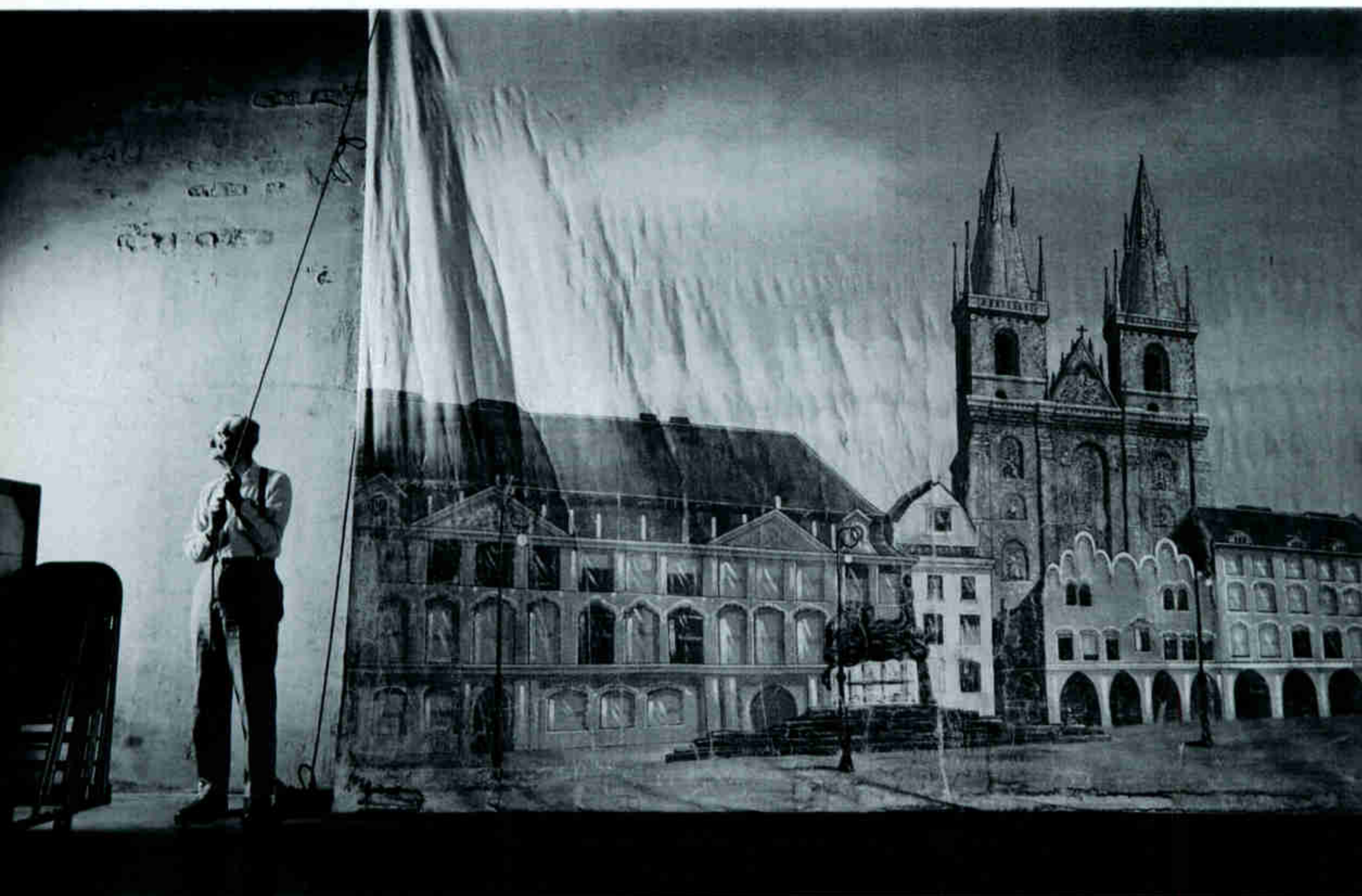
With a graduating class of eight, Hillcrest High School opens its prom to everybody in the school.



Outside it's still Cuba, but inside
on prom night with the star backdrop and
a smoke machine, it's fantasyland.



Yesterday and Tomorrow

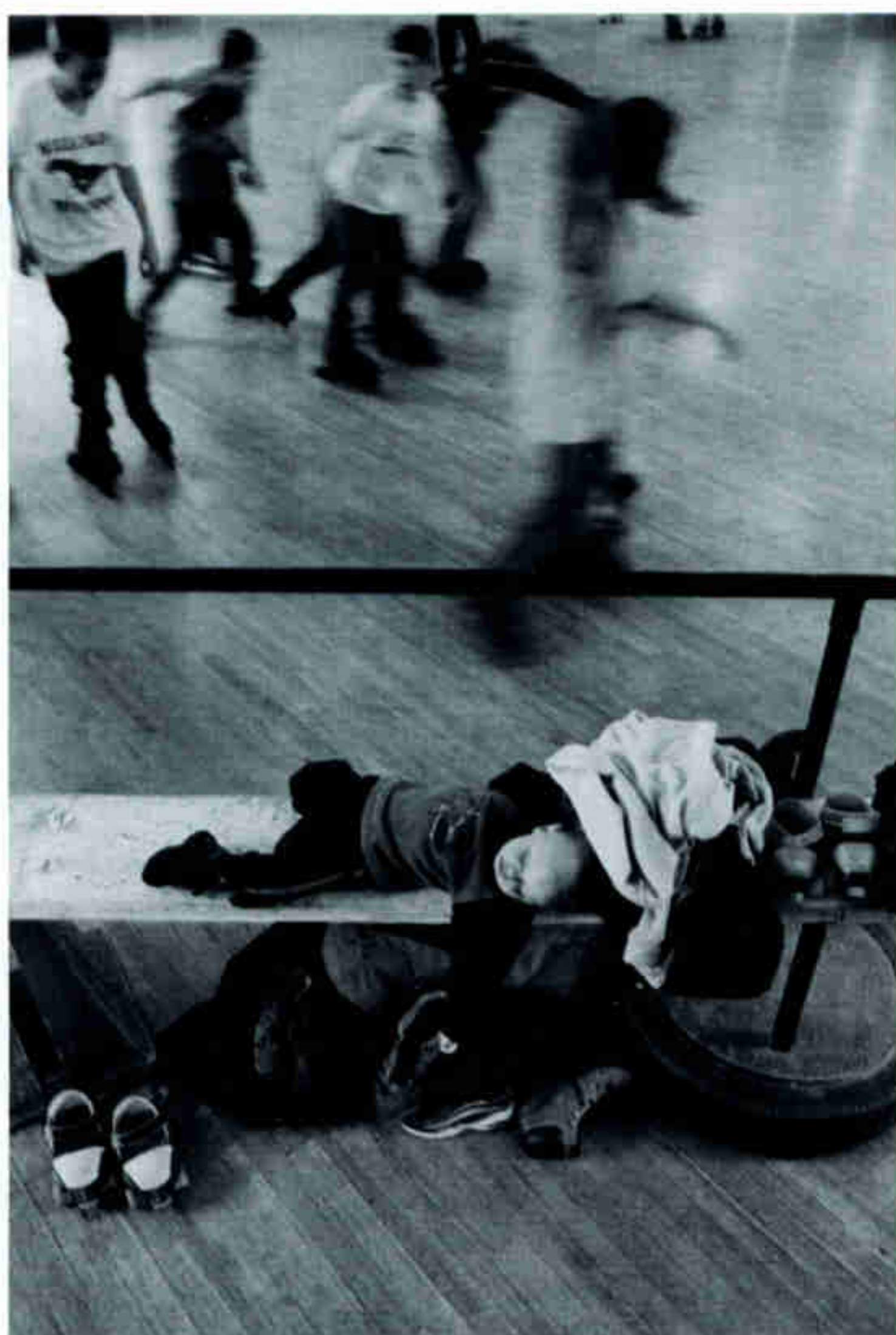


One of Cuba's last remaining Czech speakers, Charlie Heina tends to a painting of Prague's Old Town Square.
1999

WEBSITE EXCLUSIVE Browse images from Jim Richardson's 30-year love affair with Cuba, Kansas. Then check out his field notes and learn more about the town's blindfolded lawn mower races at nationalgeographic.com/magazine/0405.

RECENTLY THE OBITUARIES in my local paper noted the passing of Lourine Krob, preceded in death (as the wording goes) by her husband, Ben. I knew them as regulars at the Czech Club, back when Cuba still had enough Czechs to have a club. Among the few reminders left of the immigrant past is a painted backdrop of Old Town Square in Prague, donated by homesick immigrants and preserved on the stage of the community hall. Old-timers have a special feeling about it; the painting was the only thing that survived when the first town hall burned in 1928.

Cuba's history isn't so much written down as it is preserved by the likes of Mary



Nap time in Cuba doesn't stop the action on the new skating floor at the community hall.

2002

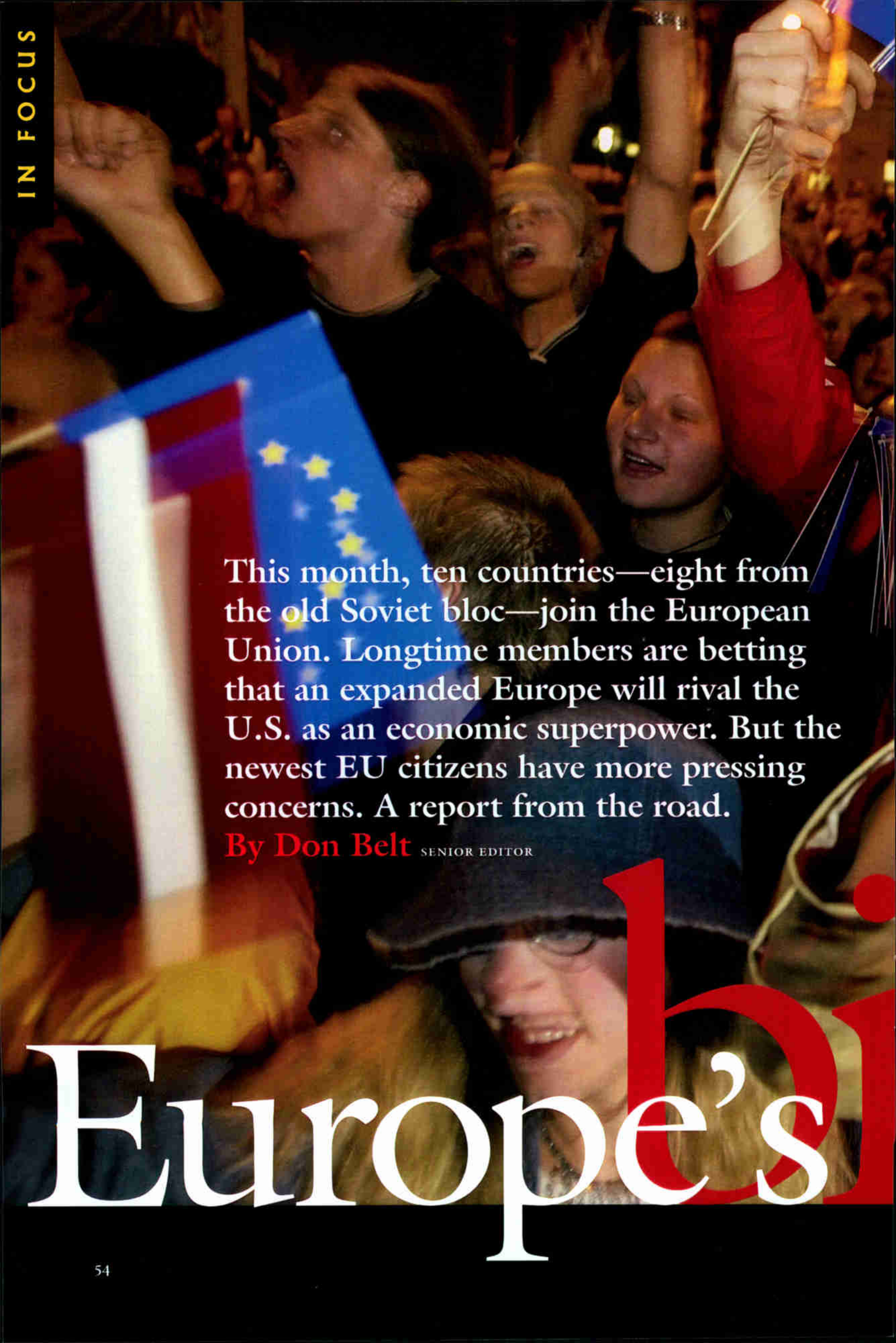


Mary Krasny loved how diabolical she looked when she peered through her fancy back door.

1983

Krasny. Visiting with her, I saw how high school class photographs from the World War I era leapt to life in her hands as she remembered who loved whom (and who didn't). Mary's voice is silent now, her spirit sorely missed.

If I put stock in statistics and trends, I'd be pessimistic about the health and longevity of Cuba. Since 1950 Cuba's population has fallen by a third, to 231; Republic County's high mark in population—19,000—came more than a century ago. But three decades of visiting Cuba has taught me to put my faith in the townspeople. I know these folks. They're not done yet. □

A photograph of a crowd of people at night, likely during a celebration or protest. In the foreground, a woman with short dark hair is looking upwards with an open mouth, as if shouting or cheering. To her right, another woman with blonde hair is also looking up. In the background, a man with a mustache is visible. A European Union flag is prominently displayed on the left side of the frame. The scene is illuminated by warm, artificial light, possibly from streetlights or stage lights.

This month, ten countries—eight from the old Soviet bloc—join the European Union. Longtime members are betting that an expanded Europe will rival the U.S. as an economic superpower. But the newest EU citizens have more pressing concerns. A report from the road.

By Don Belt SENIOR EDITOR

Europe's



gambles

Young Latvians rally to support EU membership at a rock concert in Riga.
The former Soviet republic voted overwhelmingly to join the European bloc.

Stanislaw Nowak wasn't much of a communist. In the 1980s Nowak, a young fruit grower in the hilly Małopolska region of southern Poland, was unhappy with the price that the state-run collective was paying for apples, pears, and plums. But while other farmers were grumbling like good Polish communists, Nowak was cramming two tons of fruit into his one-ton truck and setting out over bad roads to distant cities—Warsaw, Poznań, Gdańsk—to sell on the black market. He traveled alone, squeezed in between bushel baskets with barely enough room to turn the steering wheel. If the police stopped him, he'd plead

poverty and tiny mouths to feed, and send them home with an armload of fruit.

When communism crumbled in 1989, leaving many Eastern-bloc farmers to ponder their fate around the kitchen table, Nowak invested his savings in a larger truck, planted more trees, and began marketing dried fruit and bottles of homemade *śliwowica*, a brandy made from plums. And in 1994, when Poland applied to join the European Union (EU), Nowak, like everyone else, joked about clueless Eurocrats who don't know a sheep from a sheepdog, but he also started planning ahead. "No matter what system you live under, you always have to work hard," Nowak, now 43, explains. "But you also have to think. And sometimes you have to take risks."

There's a word in Polish, *sprytny*, that describes Nowak's mentality—a playful, combative, opportunistic state of mind, which has helped the Poles survive one invasion after another for the past thousand years. The most recent—Soviet-imposed communism—set out to obliterate *sprytny* from the face of the Earth, using terror as an instrument of persuasion. Even in populations as resilient as the Poles, the fear it dispersed took a toll on the minds of ordinary people, like a toxic mist in the air that settles over a town and enters the collective bloodstream, rendering its people passive and lethargic.

Eight of the ten countries joining the European Union this month—Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Hungary, and Slovenia—ingested that poison for 50 years, which makes their decision to engage the freewheeling capitalists of Europe all the more audacious. To succeed, they'll need to get communism out of their system, and

quickly. But as a taxi driver in Kraków put it, "We were sick for 50 years. It's going to take some time for the symptoms to disappear."

The European Union wasn't meant to heal the sick; it was designed to create wealth. Founded in 1951 as a trade alliance, the EU has grown cautiously, from a cozy group of six at the beginning to 15 member states in 1995, all of them in Western Europe. By integrating their economies and lowering tariffs, these countries created a common market for goods and services, achieving unprecedented levels of prosperity. They also raised the standard of living in poorer EU regions through development grants and subsidies, along with the demand for resources and cheap labor. Today Europe Inc., headquartered in Brussels, is poised to become a global behemoth—a market of 455 million people with a combined GDP of 10 trillion dollars, making it second only to the United States as a political and economic superpower.

Even so, the prospect of adding 10 new countries, 74 million people, and 280,000 square miles to the EU all at once strikes some current members as a reckless gamble—especially since the newcomers were commonly referred to, not long ago, as the basket cases of Europe for their poverty, corruption, porous borders, and lack of development. When the people of the EU were asked, in a 1999 survey, whether welcoming new countries should be a priority for the Union, six out of ten said no.

People in the acceding nations—which also include the island nations of Cyprus and Malta—have doubts of their own. Economically, they stand to gain from the influx of capital, jobs, and opportunity that

(Continued on page 62)



IN BUDAPEST'S MARXIM CAFÉ, COMMUNIST SYMBOLS SERVE AS DECOR RATHER THAN PROPAGANDA.

WILL ECONOMIES BLOOM OR BUST?

The new EU countries face both economic opportunity and uncertainty as they plunge into a European single market. Some industries expect quick profits. In Hungary and the Czech Republic, the film and tourism sectors are poised for increased growth thanks to the nations' low costs, skilled labor, and rich scenery. Still, analysts predict it will take decades for most new members to reach the economic strength of older ones. Farmers are especially concerned: Most have small plots and outdated equipment but must compete with the EU's modern agribusinesses. Some observers worry that rough times could stoke nostalgia for communism. But at Budapest's Marxim café, communist icons serve capitalist purposes—they help sell pizza and beer. "This place represents something like a joke to young people," says 28-year-old Orsolya Galla. How do her parents feel? "They don't think much about communism anymore," she says. But her father, who relies on a state pension, remains unsure about life in the EU. "He's worried," she says.



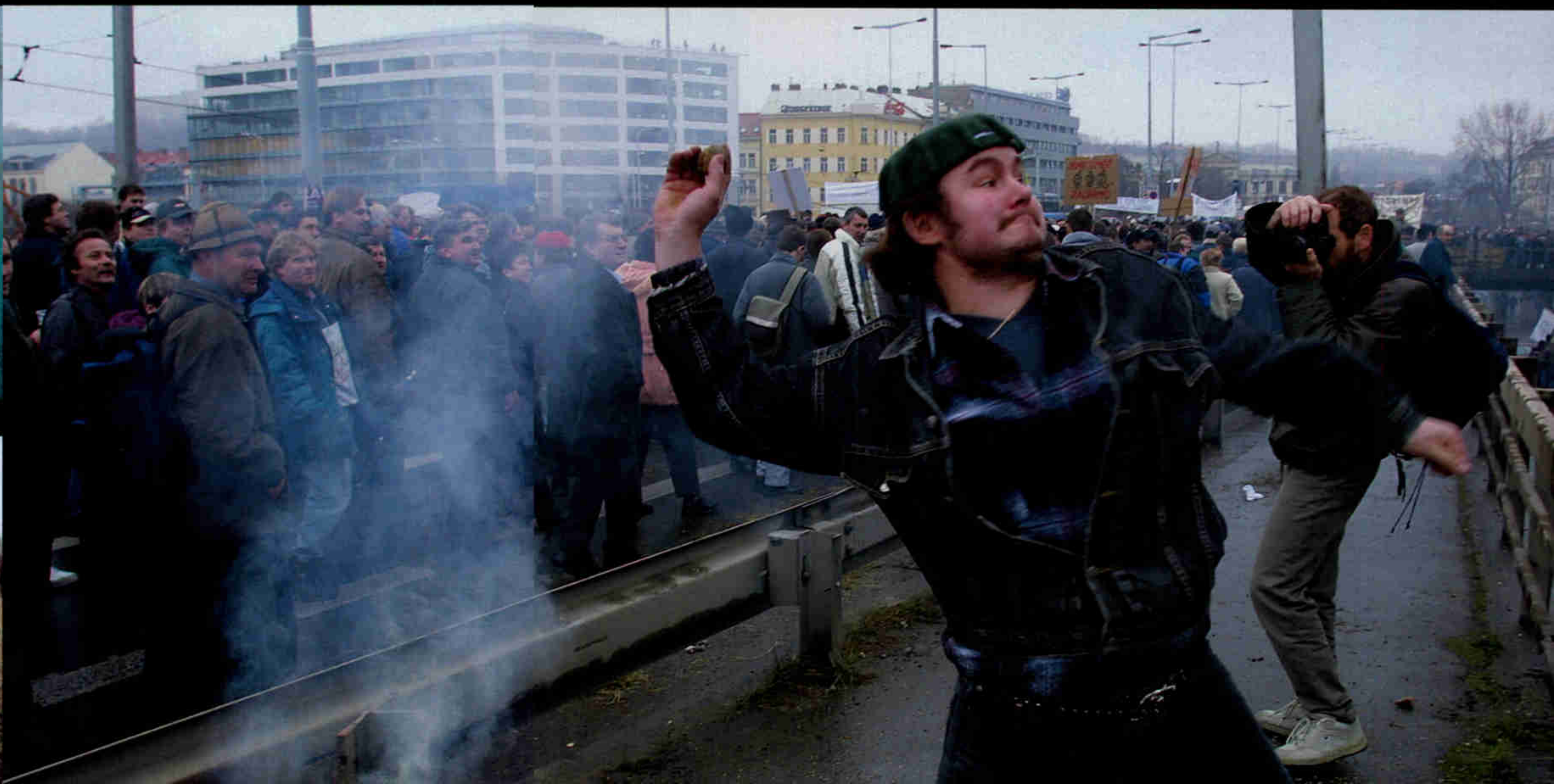
A RAPESEED FIELD BLOSSOMS IN LATVIA.



HUNGARY'S ELABORATE THERMAL BATHS BECKON TOURISTS.



CANADIAN FILMMAKERS PREPARE TO SHOOT NEAR PRAGUE.



CZECH FARMERS PROTEST LOW EU SUBSIDIES.

EU ENLARGED

PERKS AND BURDENS FOR THE NEW KIDS IN THE BLOC

Citizens of the ten new EU members can count on major changes as their countries adjust to life in the 25-nation bloc. First, their businesses will gain easy access to a vast marketplace stretching from the Mediterranean to the Arctic. The result? "No longer will it take a mountain of paperwork and a whole day at customs to process goods coming in or going out of Slovenia," says Tomi Sefman, CEO of Slovenian bicycle maker Elan. As more goods circulate, consumers should get a wider selection and cheaper prices. Eventually workers will move as freely as the goods they produce, seeking jobs in any member country. But joining the EU has come at a cost. The new members each had to adopt 80,000 pages of new regulations and must now contribute to the Union's coffers. Initially most of the new members will receive more funds than they pay out: The EU has pledged to spend 28 billion dollars over the next three years to improve their infrastructure. Beyond economics, Lucia Antalova, a graduate student from Slovakia, sees a psychological benefit: "EU membership will draw a clean line between our future and our past."



STALIN WORLD

"There's no happier youth in the world than Soviet youth!" proclaims an old propaganda poster at "Stalin World," a Soviet-themed amusement park built in 2001 by a local entrepreneur in Grūtas, Lithuania. Today's youth regard it as a kitschy oddity, while some older people say it stirs painful memories.

MARTIN PARR, MAGNUM PHOTOS

15 EXISTING MEMBER COUNTRIES

10 NEW MEMBER COUNTRIES

EU Citizens

The ten new members represent 16.3 percent of the EU's 455 million citizens. If Romania, Bulgaria, and Turkey join later, the EU will total 553 million.

Population Bust

Cyprus and Malta are the only new members whose populations are growing. The entire EU population is expected to decline 4.6 percent by the year 2050 (from 2000 levels).

Infant Mortality

Cyprus, Czech Republic, Malta, and Slovenia have lower rates than the U.S. (7 deaths per 1,000).

Life Expectancy

Among the new EU citizens, Maltese live the longest—78.2 years—and Latvians the shortest at 70.9.

Urban-Rural Divide

The ten-nation expansion adds 94 million acres of farmland to the EU. New members won't be eligible for full EU farm subsidies until 2013.

Unemployment Rate

Slovakia and Poland need to create the most new jobs.

GDP

Some new EU citizens worry that prices will rise faster than their incomes will grow.

Cell Phones

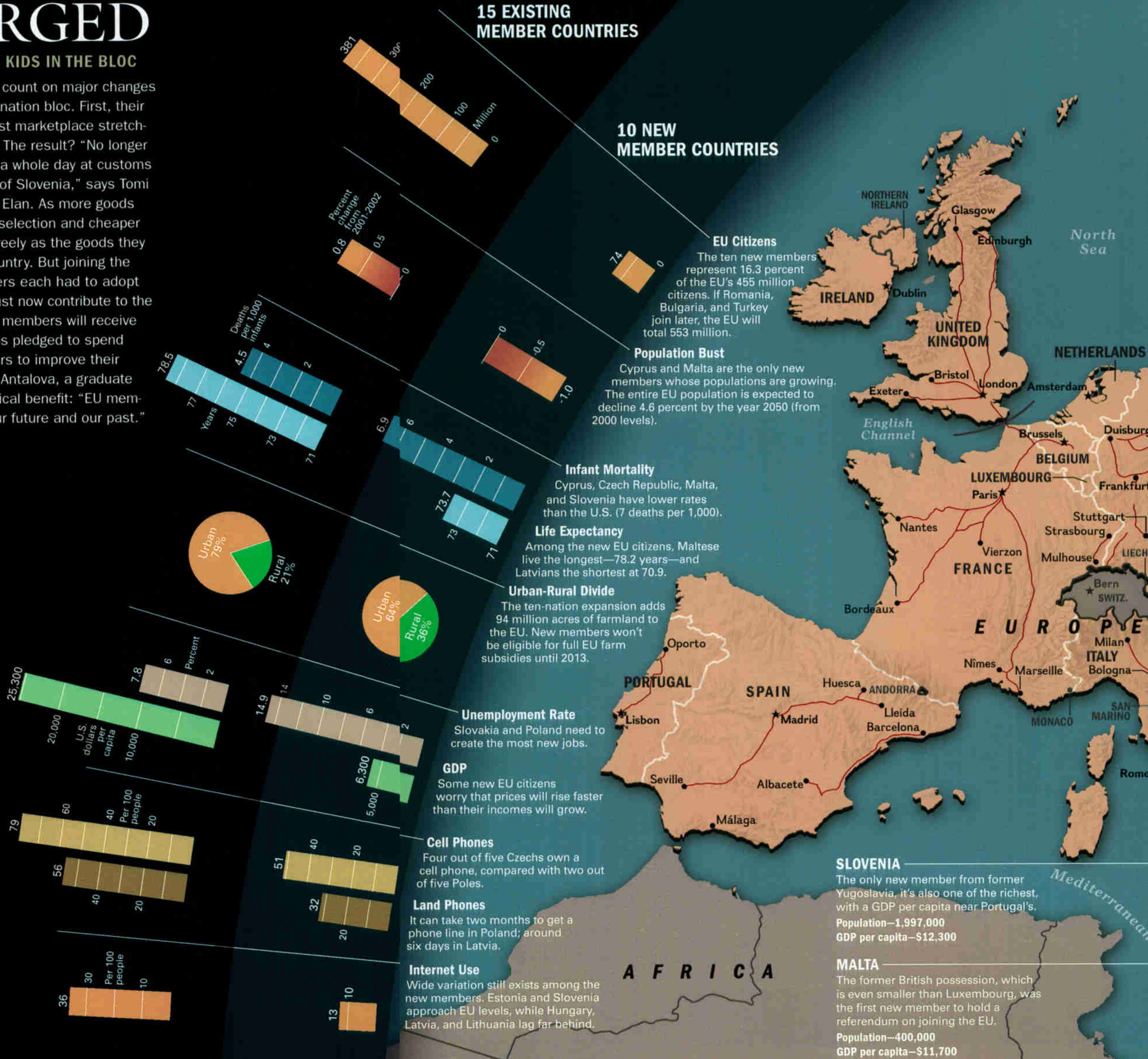
Four out of five Czechs own a cell phone, compared with two out of five Poles.

Land Phones

It can take two months to get a phone line in Poland; around six days in Latvia.

Internet Use

Wide variation still exists among the new members. Estonia and Slovenia approach EU levels, while Hungary, Latvia, and Lithuania lag far behind.



SLOVENIA

The only new member from former Yugoslavia, it's also one of the richest, with a GDP per capita near Portugal's. Population—1,997,000 GDP per capita—\$12,300

MALTA

The former British possession, which is even smaller than Luxembourg, was the first new member to hold a referendum on joining the EU. Population—400,000 GDP per capita—\$11,700





IN THE CZECH REPUBLIC, TRUCKERS AWAIT CUSTOMS INSPECTION BEFORE BRINGING GOODS INTO GERMANY.

Western Europe offers. But there will be growing pains too. Some will find their sense of nationhood subverted just a few short years after gaining independence; others will struggle as businesses born in the afterglow of socialism are forced to compete on a level playing field. As I traveled through the newcomer nations on the eve of the expansion, many people sounded like high school seniors on their way to the prom: excited, but riddled with insecurity and questions of identity. Do we measure up? Who will we become? Are we ready for this?

Good questions. These new members lag far behind the existing EU in many areas, from productivity and per capita income to life expectancy and health. Even those at the head of the class—Cyprus, Malta, Slovenia, and Estonia—will need several decades to catch up to the 15 older members. The others will take even longer.

Just getting to the starting line was a monumental task, since each nation was first required to overhaul its legal and financial systems to meet tough EU standards on trade, banking, business law, the environment, and minority rights. That transition has been far from painless: Ask the Hungarian winemaker whose wine, which once had home-field advantage due to import tariffs, must now compete with the best

wines in Europe, or the retirees whose pensions, frozen in the name of fiscal austerity, haven't kept up with rising prices. "The rich get richer, the poor get poorer," said Helena Zapala, an earthy woman in her 60s who sells cheese on the streets of Kraków. "Where does that leave me?"

Also at risk are farmers, especially those in Poland, where they represent 20 percent of the population (versus 2 percent in the EU) but create less than 5 percent of the country's wealth. In a nation of more than two million farms, fewer than half are productive enough to qualify for EU support, which is given sparingly. The rest, now stripped of the Polish government subsidies that have kept them afloat since 1989, must fend for themselves.

"They're waiting for someone to tell them what to do," said Jacek Przybylski, a journalist for Polish TV who focuses on farming issues. "But from now on, no one will." Long revered as the backbone of the nation, farmers are feeling ill equipped and helpless, trapped in the old mentality.

These were the issues debated during national referenda on EU accession. But in the end, voters in these countries, many caught for decades in the territorial brawl between the Soviet east and German west, may have simply embraced the first superpower that had the good manners to

CROSSING (OUT) BORDERS

Complete freedom of movement will phase in gradually. EU citizens can travel anywhere in the bloc but must still show an ID when crossing borders between old and new members, like the one dividing Germany and the Czech Republic. Within a few years such trips should be as easy as passing between U.S. states. But first the EU insists new members tighten their non-EU borders—the Union's frontiers—against illegal immigration and smuggling. A new EU law will allow longtime foreign workers to stay indefinitely—a boon to Cyprus, which relies on imported labor.



A TEMPORARY RESIDENT SHOPS IN CYPRUS.



GERMAN BORDER POLICE ARREST AN ILLEGAL IMMIGRANT.

ask. "For Hungary, these two invitations—to join NATO in 1999 and the EU in May—were the first real signs that the Western world needs us," said Miklós Déder, a national security expert in Budapest. "Our yes vote means we've made a choice to be Europeans, not Eastern Europeans. It means the end of ambiguity."

Home to 129,000 people and a half dozen large manufacturers, Győr, Hungary, illustrates the promise—and the pitfalls—of membership for the acceding countries. Győr owes its prosperity, and its low 4.5 percent unemployment rate, to EU-based companies like Volkswagen's Audi division, which moved here in 1993 to build engines, attracted by Hungary's low-cost workforce and its penchant for granting tax exemptions to foreign investors.

But Audi's tax breaks, it turns out, did not

conform to EU law, and threatened to complicate Hungary's bid for membership. When the EU told Hungary such tax breaks would have to end, some worried about a mass exodus of manufacturers to less developed nations, where wages are dramatically lower. After two years of negotiations the EU agreed to grant Hungary a temporary exemption, and everyone breathed a sigh of relief. But the episode revealed a painful truth about life in the EU: The people of Győr—and Hungary—will be answering to Brussels from now on, and will be more vulner-

able to forces beyond their direct control.

"There's a lot of fear in the air right now," said Steven Arnyek, a freelance photographer in Budapest. "What happens when one of these big foreign factories decides to pack up and leave? And how will our small businesses survive when they're totally unprepared to deal with EU regulations? These are just a few of the things our government has not yet bothered to explain. I'm for the EU—it's a necessity—but I also think it's going to be a catastrophe."

Despite the anxiety, there was no denying the palpable excitement I found among easterners who came of age after the fall of the Berlin Wall. "My daughter, who's 15, may grow up to feel more European than Czech. But most of all, she'll feel free. Hers is the first free generation," said Jiri Pehe, director of New York University in Prague, who fled communist Czechoslovakia in the trunk of a car in the 1980s and returned

GROW TODAY, SHRINK TOMORROW?

The ten new member nations have swollen the European Union's ranks to 455 million people. Despite that surge, the population tide will soon ebb. None of the 25 nations is producing enough babies to head off a downward trend. At current birthrates the EU's population will fall to 431 million by 2050. And as life expectancies rise, fewer workers will support more pensioners. "We need to bring our population back into balance," says EU Commissioner Anna Diamantopoulou. Yet resistance to a possible solution—increased immigration—remains high.

AN ELDERLY SLOVAK BEGS IN BRATISLAVA.

after the Wall came down. "Fifteen years ago my country was surrounded by watchtowers and barbed wire," he said. "Today we're surrounded by open borders."

In a Budapest café, an eager-faced woman in her 20s named Szilvia Pásztor said she's registered with an au pair agency so she can work in other EU countries—first in London ("to learn good English") and then in Paris. After Paris? "I not know," she said slowly, and beamed a broad smile glittering with new braces. "In the EU, everything possible!"

The tension between Europe's future and Europe's past is starkly evident in Estonia, one of three Baltic nations set to join the EU this month. Annexed by Stalin in 1940, overrun by the Nazis a year later, reconquered by the Soviets in 1944, liberated by the fall of communism in 1991, and invigorated by capitalism in the 1990s, Estonia is the whole drama in a nutshell.

I drove east on the highway that connects the capital of Tallinn with Narva, on the Russian border. Nearly everywhere I looked I saw the handiwork of the European Union, starting with the road itself. The EU has already invested millions of euros to improve the highway, which serves as the main link to St. Petersburg, Russia. This highway passes the town of Sillamäe, once a "closed" city run by the Soviet military, which enriched uranium for weapons programs in a huge factory overlooking the sea. The EU is here,

too, kicking in more than a million dollars to help prevent the radioactive waste from leaching into the Baltic Sea. And at Narva, a city of 70,000, the EU is spending some 12 million dollars to upgrade the border crossing to deter illegal immigration, drugs, and human trade.

Capt. Jaanus Lumiste of the Border Guard had conducted three tours the week I arrived for various EU officials, who were suitably impressed with the state-of-the-art computer system, the 22 television monitors, the infrared scanner for bogus passports, and the no-nonsense approach of the Estonians manning the barricades. "Two million people crossed this border last year," Lumiste said with a slight smile, nodding at the bank of monitors. "Today we are ready."

Now that the border is fortified, Estonians are still pondering what to do with the 400,000 Russians in their midst, most descended from the thousands of Russians sent here, starting

POLISH BOYS RIDE PAST A COMMUNIST-ERA TANK NEAR GDAŃSK.



NEWLYWEDS CELEBRATE AT SLOVENIA'S CELJE CASTLE.

in the 1950s, to help control the openly defiant Estonians. This awkward relationship was turned upside down in 1991, when the Soviet Army demobilized and the occupiers became uninvited houseguests. Many Russians assimilated, but 120,000 are Russian citizens who speak little or no Estonian yet have no intention of going home. Here again the EU has intervened, making fair treatment of the Russian minority a precondition for Estonia's membership.

Despite the shiny new EU presence in Estonia, there are still vestiges of the communist past. In Narva, just before dark, I came upon the last statue of Lenin still standing in Estonia. Cast in bronze and perhaps 20 feet tall, this figure once dominated the Narva town square, but in 1991, as Lenin statues all over eastern Europe were being sledgehammered into scrap metal, this one was moved to safety by local Russians. Today it's lodged in the side yard of a castle overlooking the Narva River. Though it was driving rain, I got out of my car for a closer look, which is when I noticed the flowers. Strewn across the base of the statue, between Lenin's boots, were dozens of carnations and roses, placed there, I supposed, by local Russians. Like flowers on a grave, they were wilted and sad in the gathering gloom, dead but not yet buried.

Failures of history are of little interest to Stanislaw Nowak, the Polish fruit grower, who spends his time thinking about the future. But Nowak is no idle dreamer: Over the past few years he and wife Anna have turned their rustic farm in Małopolska into a model of EU compliance. They were, in fact, the first farmers in their district to apply for an EU subsidy, which provides matching funds to help farmers update their operations. Unlike most of their neighbors, the Nowaks had the capital, the acreage, the persistence, and the business plan to back up their application, which was approved by Brussels in 2003.

As Nowak showed me his orchards in the waning light of a winter day, his enthusiasm for his family's future, and Poland's, rose as the temperature dropped. He is optimistic, he says, not because he has forgotten the past, but because he remembers it clearly. "We lived through the Nazis and we lived through the Communists," he said with a dismissive laugh. "So we are not afraid of the European Union." □

ROOM FOR ONE MORE? At press time, only the Greek side of Cyprus was slated to join the EU, but Turkey was trying to meet a May 1 deadline to have its side of the island included too. Get an update at nationalgeographic.com/magazine/0405.



PLACE OF THE

Evidence of a once thriving city, a forest of stone sculptures at Takalik Abaj in Guatemala speaks silently of the Maya and preceding Olmec cultures. Here archaeologists have discovered one of the earliest royal Maya graves yet—the richly appointed burial of a nameless king who ruled more than 1,800 years ago. Hieroglyphs on nearby stone monuments are some of the earliest Maya writing ever found.

BY CLIFF TARPY
NATIONAL GEOGRAPHIC SENIOR WRITER

PHOTOGRAPHS BY KENNETH GARRETT

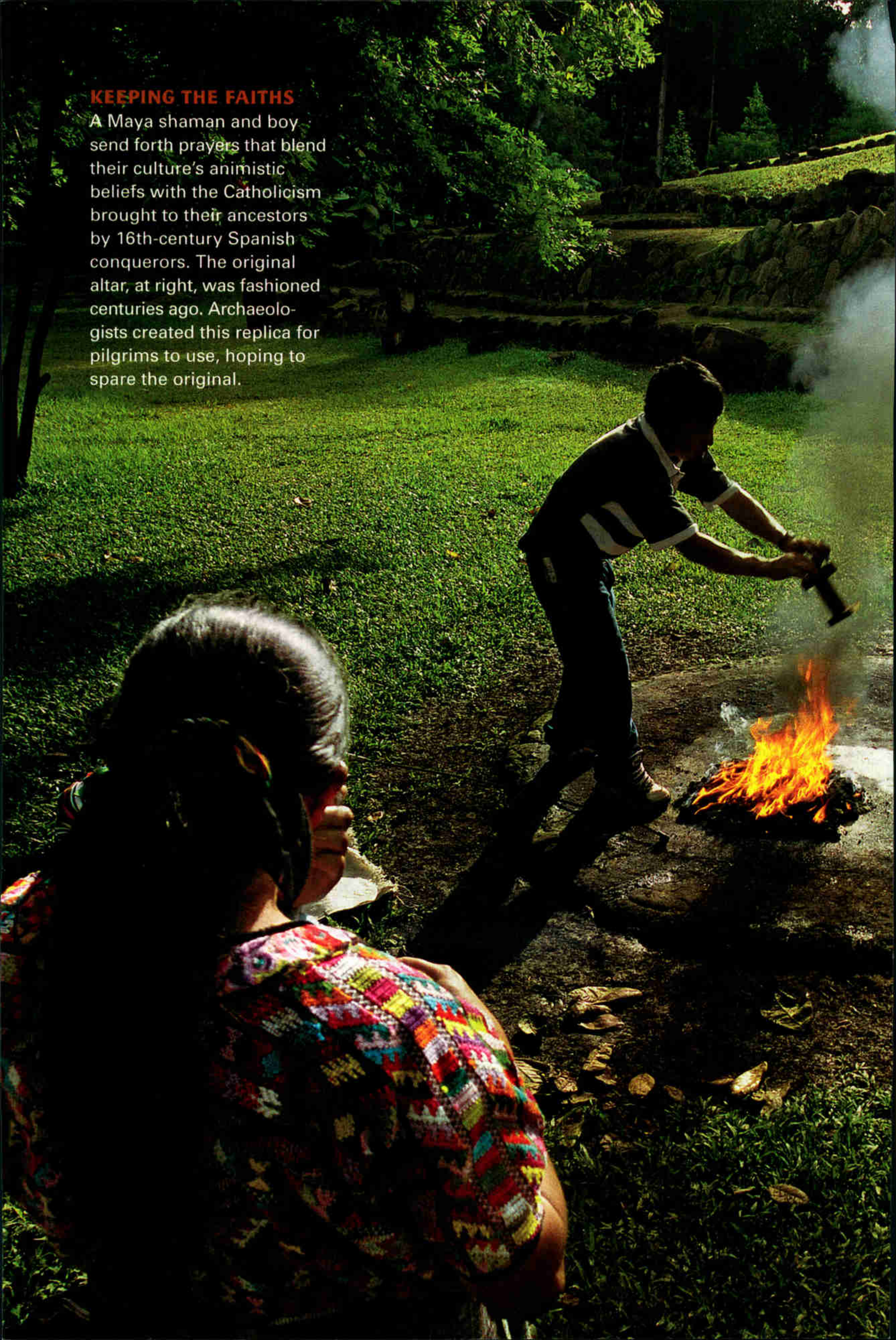
UNEARTHING
A KING FROM
THE DAWN
OF THE MAYA

STANDING STONES



KEEPING THE FAITHS

A Maya shaman and boy send forth prayers that blend their culture's animistic beliefs with the Catholicism brought to their ancestors by 16th-century Spanish conquerors. The original altar, at right, was fashioned centuries ago. Archaeologists created this replica for pilgrims to use, hoping to spare the original.







LONG HIDDEN beneath a canopy of coffee trees in southwestern Guatemala, a ceremonial plaza cleared of overgrowth (above, at lower left) only hints at what lies nearby. Within an area of 2.5 square miles, more than a dozen similar plazas and some 80 buildings have been found—one holding the trappings of an early Maya king. Little is known about this leader who ruled the long-deserted metropolitan center now known as Takalik Abaj, but his domain was one of “extraordinary power,” says archaeologist Christa Schieber de Lavarreda of Guatemala’s Ministry of Culture and Sport.

One reason for the city’s prosperity is reflected in the gravel road (above, at right) that traces a trade route used during the city’s heyday from the eighth century B.C. through the second century A.D. Merchants

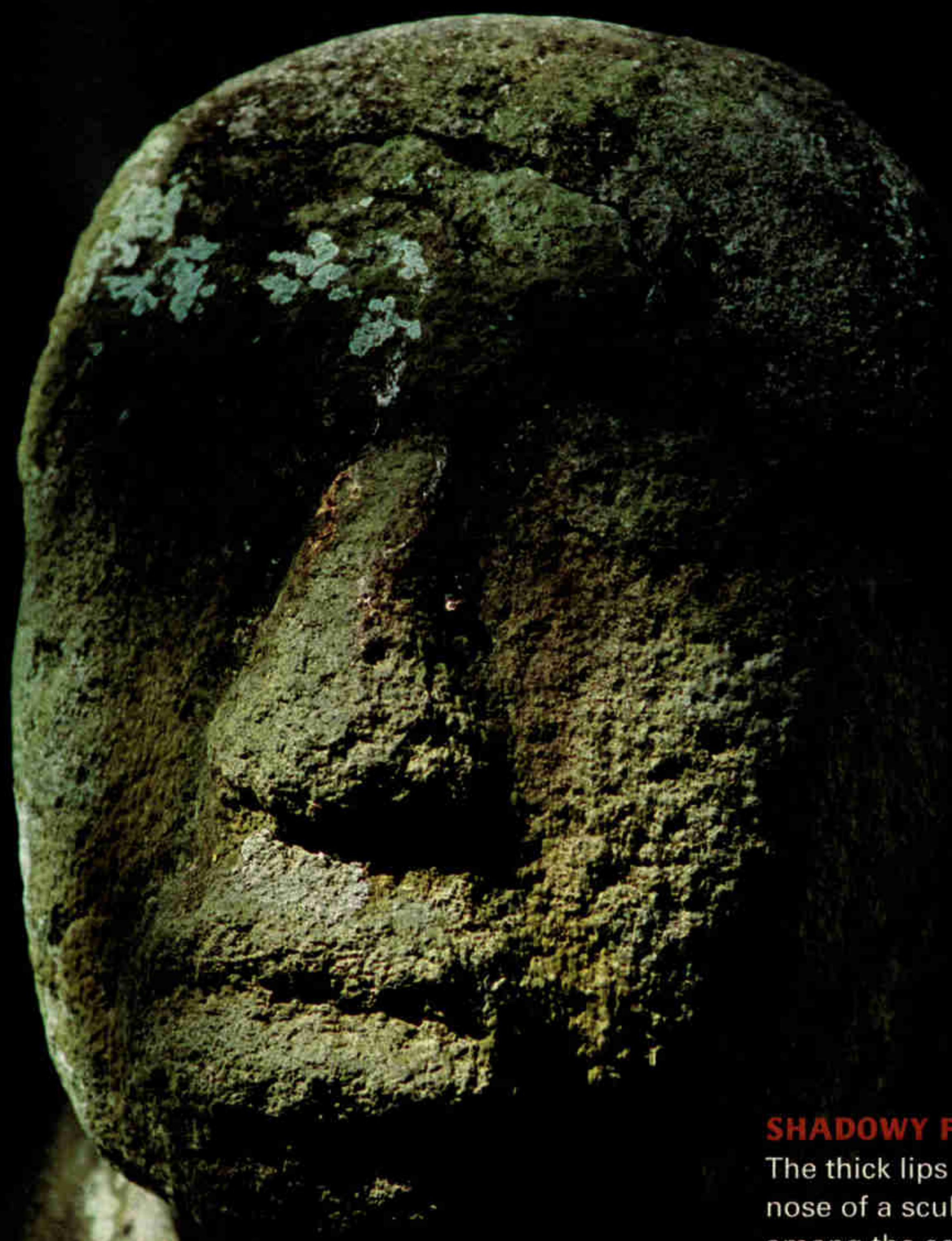
hauled highly prized cacao and salt to cities as far away as present-day El Salvador and Mexico, returning with quetzal feathers, pyrite, obsidian, and jade for tools, jewelry, and works of art. “Takalik Abaj evolved into one of the most important economic and cultural centers of early pre-Columbian times,” Schieber says.



SOCIETY GRANT

This research project was supported in part by your Society membership.

**BEFORE THE MAYA CAME THE
OLMEC CULTURE, WHICH LEFT BEHIND
CURIOUSLY ROTUND STATUARY.**



SHADOWY FIGURE

The thick lips and broad nose of a sculpture found among the coffee trees reflect the influence of Olmec culture. The Olmec, who preceded the Maya, flourished between 1200 and 400 B.C., spreading their traditions from southeastern Mexico to become the "mother culture" of Mesoamerican civilizations.



Excavations here date from the late 19th century after a botanist spied the tips of sculpted stone monuments jutting from the ground. Since then 277 monuments, largely from the Olmec and later Maya cultures, have been discovered at Takalik Abaj, which means “standing stones” in Mayan. (The name was recently corrected from the Spanish-style Abaj Takalik.) Several of the Maya monuments bear intricate inscriptions that have proved to be some of the oldest Maya glyphs. The site is now protected as a national archaeological park.

The locations of the standing stones may be as meaningful as the inscriptions. The careful alignment of the monuments on a large platform called Structure 7 suggests it served as an astronomical observatory (facing page). Tracing the alignment, Schieber and her colleagues first uncovered a decorated stela surrounded by an offering of 660 vessels. “As we dug deeper, we got excited when we smelled the carbon deposits of the incense they used in ceremonies,” she recalls. Behind that stela, deep inside a small building, the team found the unlooted royal grave. This king, buried in his regalia, is presumably the last of the Maya rulers at Takalik Abaj.

WHEN DID THE MAYA FIRST APPEAR? Uncover more clues in the new National

Geographic Special, *Dawn of the Maya*, premiering in the U.S. May 12 at 8 p.m. ET on PBS.

POINTING TO STARS

Standing at the heart of Takalik Abaj, the large platform called Structure 7 (diagram below) may have been an astronomical observatory. From here ancient residents could have tracked the movements of the stars above volcanic peaks such as Santa Maria (right). Building on theories of archaeologist Marion Popenoe de Hatch, project directors Miguel Orrego Corzo and Schieber followed the alignment of monuments on Structure 7 with the constellation Draco to discover the untouched royal burial just beyond the decorated monument called Stela 13. Artists study the serpent design—a common Maya motif—on fragments of Stela 13 (top left).

The Maya may have realigned Olmec-period monuments to point toward Eta Draconis in the serpent-shaped constellation Draco.

Draco constellation

Eta Draconis

OLMEC

MAYA

Structure 7A

Stela 13

Burial site

Offering pit

Structure 7

Structure 7 is one of eight dozen ceremonial plazas and buildings constructed between 800 B.C. and A.D. 900 on the slopes of ten natural terraces.

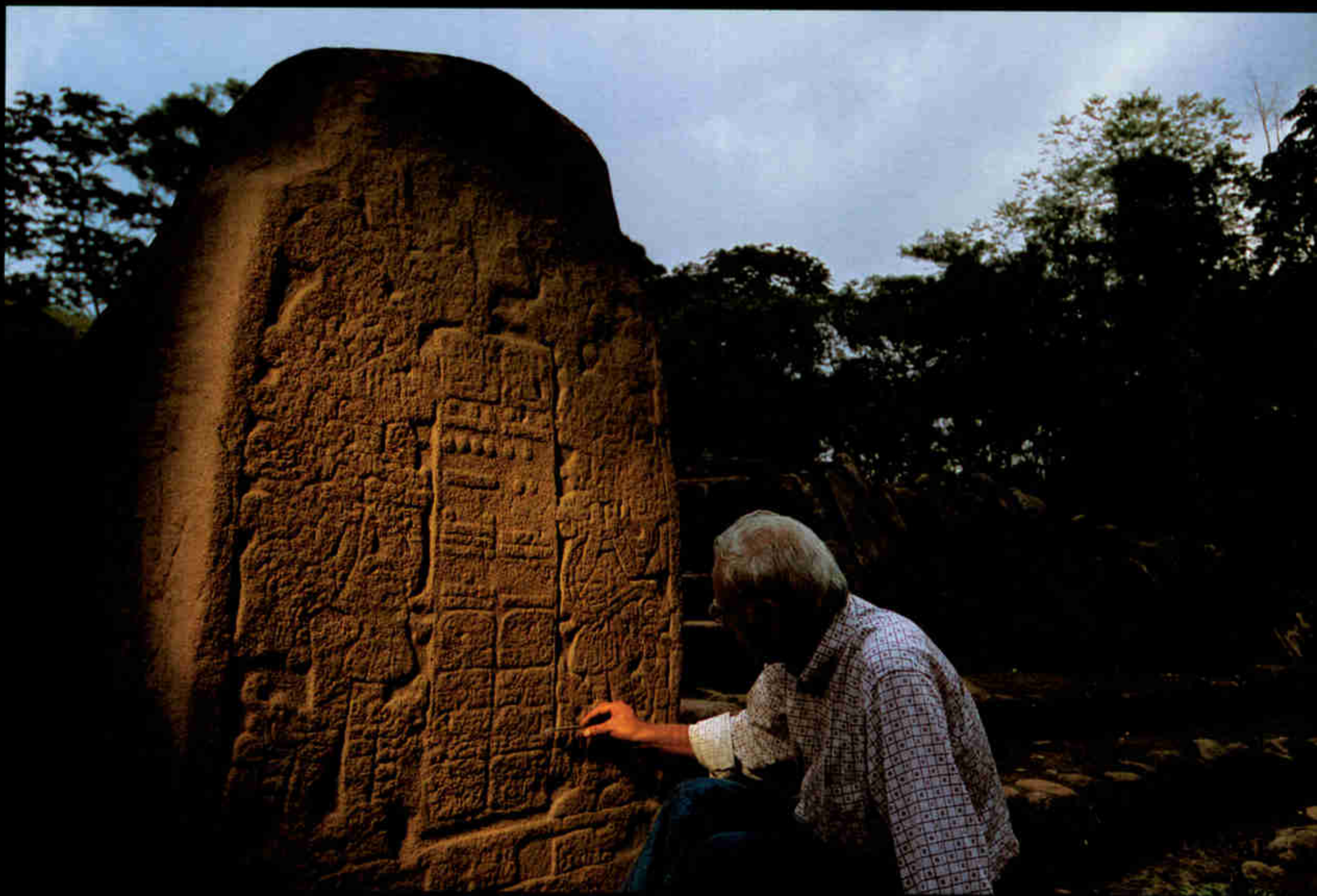
AREA
ENLARGED
ABOVE



AN ELABORATELY INSCRIBED MONUMENT RECORDS A CHANGING OF THE GUARD FROM ONE MAYA KING TO THE NEXT.

POWER POLITICS

A Maya king is proclaimed on the side of a stela that depicts him on a throne wearing an intricate head-dress (left). On the front of the stela (below) a scene shows one ruler facing another, suggesting a transfer of local authority from a first-century king, at right, to a second-century king, at left. Archaeologist Orrego believes the later ruler may be the one whose burial site was recently discovered.





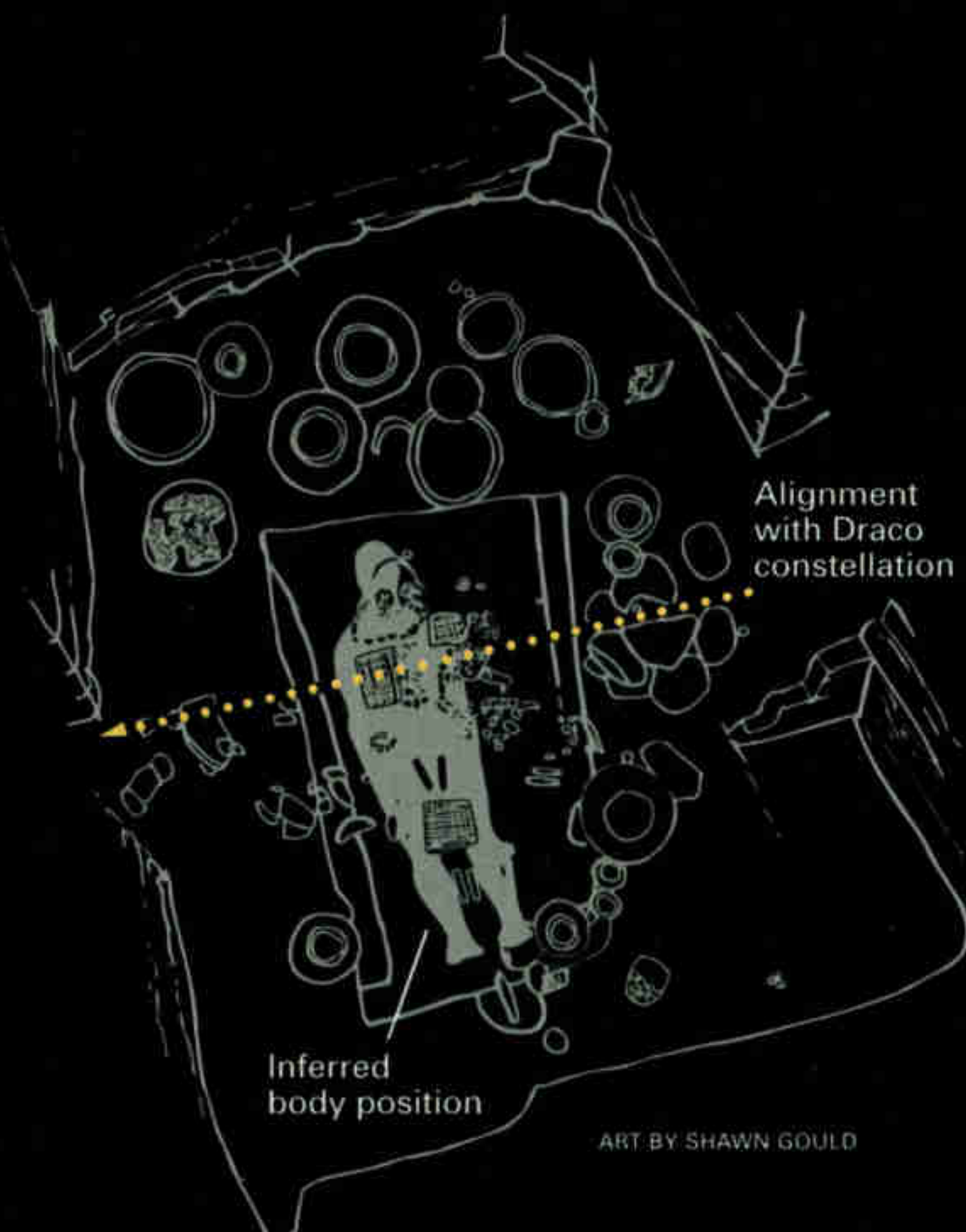
ROYAL FLASH AND DAZZLE

As the finery found in his tomb attests, a king must dress the part whether alive or dead. A greenstone fish glistens with a pyrite eye (above). A jade necklace and other jewelry (below left) adorned the ruler's body, as did a mosaic pyrite mirror (bottom left), designed to impress his subjects with glints of reflected sunlight. Found among items that would hang from his belt, a small ceremonial jade mask (below right) has been cleaned and reassembled (bottom right).



CLOSING IN ON THE KING

Inching ever deeper, Orrego (below, at left) and Schieber examine a decorative earplug, a promising clue that the remains of the king lie below in soil that retains traces of red cinnabar, commonly used in burials. Pottery offerings surround the ruler's body in this depiction of how the burial artifacts were arranged (right). Tests for the presence of phosphorus have already shown evidence of decomposed human bones. The team also plans to slice into the ground beneath where the body would have rested and take x-rays to look for remnants of the skull and other bones.



ART BY SHAWN GOULD





SILENT SENTINELS

Drooping features lend a lugubrious look to a “potbelly” head (right), a style of boulder sculpture also found along the Pacific coast and in the Guatemalan highlands. Cobblestone steps climb a pyramid (above) whose original design prefigures the grand structures of the later Maya. □

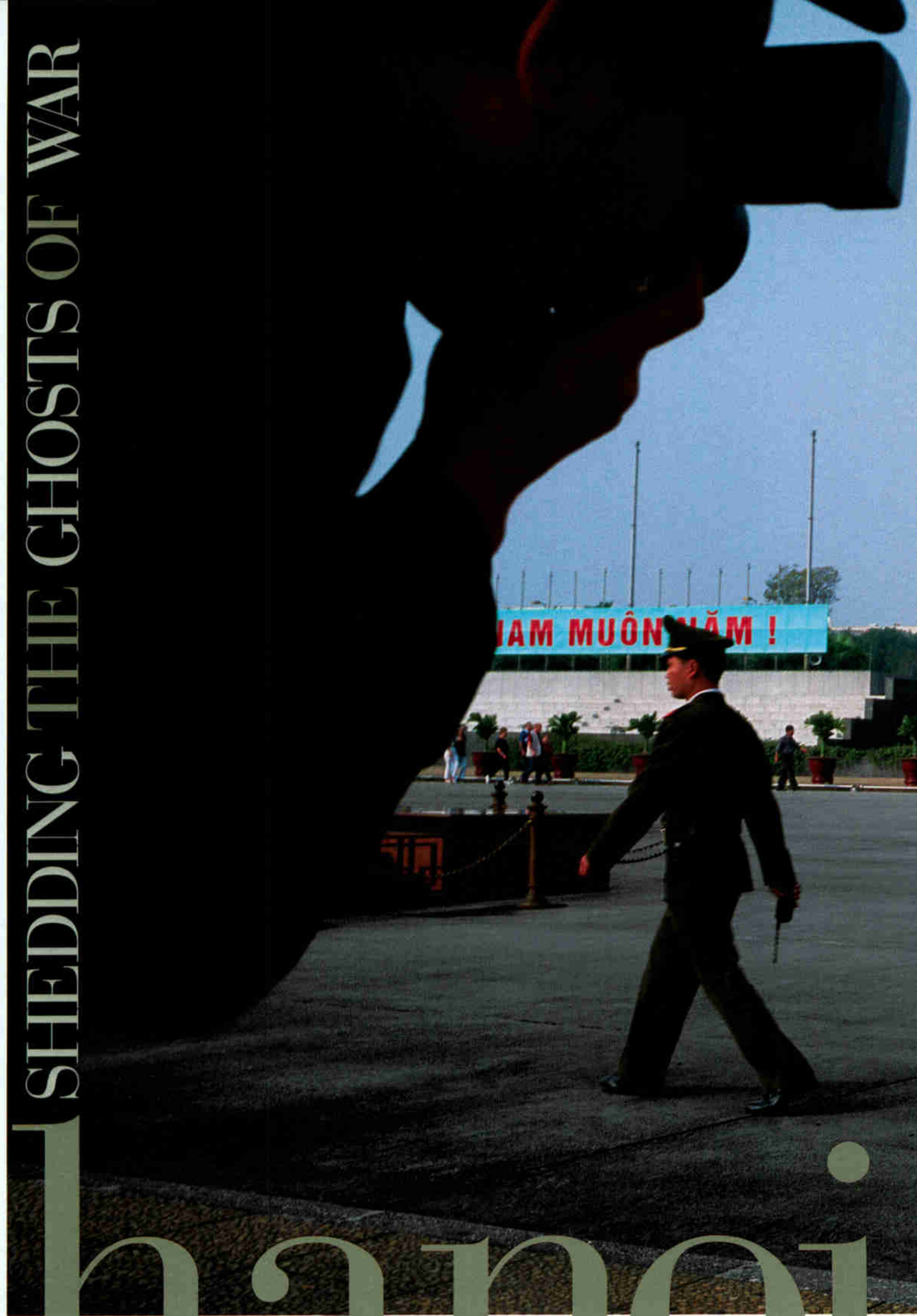
MYSTERIOUS MAYA Dig deeper into the complicated world of the Maya with resources compiled by our Research Division and a listing of related websites at nationalgeographic.com/magazine/0405.

**DISCOVERIES AT TAKALIK ABAJ
REVEAL HOW RICH AND COMPLEX LIFE
WAS FOR THE EARLY MAYA.**



SHEDDING THE GHOSTS OF WAR

hanoi





A decorated veteran poses at the mausoleum of Ho Chi Minh, the national hero who led communist Vietnam's fight against U.S. forces. Three decades after that long war's end, Vietnam's capital struggles to add prosperity to hard-won peace.



Hanoi's streets have come alive with motor scooters and commerce since the nation's government embraced free-market reforms in the 1980s. Though Vietnam remains a poor country, it no longer suffers from the near-famine conditions that triggered the reforms.





By David Lamb Photographs by David Alan Harvey

I never intended to go back to Vietnam. Never cared about seeing Hanoi. I'd already fled Vietnam twice as a war correspondent, once in 1970, after two years, and again in 1975 during the last desperate days of Saigon. Friends had said, "It's such a beautiful country. I'd love to come back when there's peace." Not me. I never wanted to go back. Memories of Vietnam and what the Vietnamese call the American War had faded into a distant, unwanted memory.

Now, a generation later, it was winter in Hanoi, the city I'd called home for several years. Beyond my ninth-floor balcony overlooking White Silk Lake, this extraordinarily beautiful capital that had surprised me in so many ways lay under a blanket of damp fog and chill. I heard the familiar sounds of the street below: the high-pitched call of the bread seller, the newsboy reciting the day's headlines through an amplifier on his bicycle, the growl of jackhammers, the tap, tap, tap of the bronze caster's hammer on an emerging statue of Buddha. It was a reassuring medley, a reminder that even as great changes were sweeping through Southeast Asia's oldest capital, the intimacy and timelessness of Hanoi lingered, undaunted by the suffering of war or the burdens of peace.

The fabled city was a blank in my mind's eye when I arrived in 1997 to open the *Los Angeles Times's* first peacetime Indochina bureau. I expected to see the scars of war, but there were none, except perhaps those hidden in the heart. I found instead a vibrant, optimistic city that carries its beauty marks—a dozen lakes, broad tree-lined boulevards, amber villas from the

French era—with a nationalistic pride. As an American I was prepared to encounter hostility, but I was greeted at every turn by wide, generous smiles and a welcoming warmth that defied logic. The Hanoi I discovered was a city in its renaissance.

Humbled by more than a millennium of war, poverty, and foreign domination, Hanoi has been rejuvenated and invigorated by the communist government's decision to open Vietnam's doors to foreign investors, tourists, and private enterprise. But rather than falling victim to the machinery of development that has pounded the character out of other Southeast Asian cities, Hanoi has stood its ground, perfumed in seductive charm, protecting all that is old and special. The city is at once approachable and aloof. In the sunshine, it feels joyful; in the mist, melancholy. It is a place where the ghosts of a lost Indochina hover in the breeze.

*Ten years, time turned into a durable thread
Flowers bloom in violets, the wall covered with
mold and moss.*

*Ten years in Hanoi and I have found
My own sort of joys and sorrows.*

The author of these words, Nguyen Duc Mau, is one of Vietnam's foremost poets, a former



A wistful young girl dressed in her best attends a wedding on the steps of the newly restored Hanoi Opera House (opposite), built by the French in 1911. As part of its colonization of Vietnam, Cambodia, and Laos, France ruled Hanoi for about 70 years, withdrawing in 1954.



North Vietnamese soldier who, during the war, wrote his verses by candlelight in the caves of Laos and the underground shelters along the Ho Chi Minh Trail.

When I visited Mau in his spartan office he had set cups for green tea on the table with a translation of poems he had read a few years earlier in the United States at a gathering of American and Vietnamese war veterans. As a war correspondent, I had known little of Vietnam's culture and history—and nothing about its long, rich history of poetry—and I asked him why all Vietnam's poets seemed to live in Hanoi.

"This is a city that nurtures the soul of a poet," he said. "It is not easily explained, but it is something you feel. In the touch of the mist. In the sight of the Red River. In the traditions, the lives of struggle. A sense of romance hovers over Hanoi like no city I know. You walk the streets,

and you're passing through a thousand years of history." He paused.

"A city of poets? Yes, people have called us that, because Hanoi has always been the home of Vietnam's artists and the intelligentsia. Part of the reason is historical: This was a seat of Vietnam's old dynasties. They provided the intellectual foundation for the north. The emperors surrounded themselves with scholars and poets, and as far back as the Ly dynasty, in the 11th century, poetry was part of our cultural identity. In the south there is no such history and tradition. Saigon didn't even exist as a city until the 18th century."

With a book of Mau's poems tucked in my pocket, I pedaled my Chinese-made bicycle along a catacomb of crowded streets. Women carrying baskets of vegetables and noodles balanced at the ends of shoulder poles padded in



U.S. bombs leveled Hanoi's bridges during the Vietnam War—known here as the American War. The rest of the city sustained less damage. Now home to about three million people, Hanoi remains more a collection of villages than a metropolis, a quiet city with a poetic soul.

sandals. They jostled for passage with motor scooters lugging live pigs, caged dogs headed for the butcher, ceramics made in the countryside, cartons of TVs, bags of sneakers. Everyone seemed in a frantic rush. Sometimes a mattress—a relatively new amenity for Hanoians—went by. I wondered what would happen to the work ethic of these industrious people when they discovered a thread-thin mat spread on the floor was lousy for sleeping and a big, fat mattress made it tough to get up with the dawn.

On Ly Thai To Street, I turned onto the sidewalk and leaned my bike against the wrought iron fence outside Au Lac Café. The café occupied the patio of a grand old villa where the wartime mayor of Hanoi had lived. From the table I had staked out as my unofficial morning office, I could look across the street and see elderly women doing their slow-motion

tai chi exercises in a nearby park and a queue of “cyclos”—bicycle-taxis that pull two-person carriages (the modern-day version of the rickshaw)—and a low, tile-roofed skyline filled with the ambience of colonial times.

Hanoi reminded me of no other city.

But by the time my first summer arrived, bringing with it breathless heat and humidity that opened every pore, Hanoi felt as much like home as any place I'd lived since childhood. Although it is a big city, with a population of about three million people, its soul is that of a village. Neighborhoods are clustered among meandering alleyways. Spirits of departed ancestors drift through Buddhist pagodas. Rice fields reach to the city's doorstep. In the Old Quarter dozens of narrow lanes are still named for the crafts and businesses that entire villages migrated to Hanoi to practice—Coffin Street, Silk Street, Cotton Street, Grilled Fish Street, Gold Street—and the shops and homes and cafés are packed so tightly that the place seemed like an overstuffed closet.

Every morning, bicycling to work through Ba Dinh Square, I was reminded how deeply the history of struggle is ingrained in Hanoi's character. For more than a thousand years Vietnam resisted Chinese domination. Then the French came. An expeditionary force sacked Hanoi's citadel in 1873, and before long France's Indochina empire—modern-day Vietnam, Laos, and Cambodia—was being run from Hanoi.



Vendors cook in front of their homes on Fish Sauce Street in Hanoi's Old Quarter, where streets bear the names of trades that settlers practiced when they first arrived. Many homes have no plumbing; the city still relies on aging infrastructure built by the French a century ago.





In the half-light of a new day there were ghosts in the square, where hundreds of thousands of peasants, soldiers, traders, and intellectuals had gathered on September 2, 1945. Ho Chi Minh—who only a week earlier had been carried on a stretcher from the jungles after years battling Japan's World War II occupation army—soon appeared. Disease-ridden and 55 years old, dressed in a khaki tunic and rubber sandals, he broadcast his declaration of independence. His words would have been familiar to any American: "All people are created equal. They are endowed by their Creator with certain unalienable Rights; among these are Life, Liberty, and the pursuit of Happiness."

Ho Chi Minh had chosen his words with care, but he would get no support from President Truman. The French colonialists returned to rule and stayed until their defeat at Dien Bien Phu, on the doorstep of Laos, in 1954. Eleven years later U.S. Marines arrived, and the concentrated bombing of North Vietnam soon began. Not until 1975, when the last U.S. helicopter lifted off the roof of the American Embassy in Saigon with the last Marines from a military force that once numbered half a million, did Vietnam and Hanoi see the end of war and foreign subjugation.

Like the majority of Hanoians, 30-year-old Pham Ba Hung has never known the thunder of war, but the past is still burned into his psyche. I asked him what dividends peace had brought his generation. "Opportunity," he

Reflection of a cultural renaissance, actresses prepare backstage for a play at the opera house. Vietnam's national circus (above)—started under Russian tutelage half a century ago—took its act to the troops during the war and still reigns as one of Hanoi's best loved institutions.

said. "Maybe prosperity. And peace itself—calm and stability. My parents knew none of those things. They knew only war. Dad's brother is MIA from the American War. We set a place for him at the dinner table every night. But it's been empty for 30 years."

Hung spoke fluent English. He brimmed with enthusiasm. He had a Honda motor scooter, a cell phone, some money in his pocket and a promising career as a freelance photographer. He was, I thought, a mirror of Hanoi's postwar generation, for whom names like Hamburger Hill and Khe Sanh rang no bell of familiarity. They thought of communism as an expression of nationalism, not a political ideology, but paid little attention to slogans that emanated from party headquarters, where the old guard leadership clung to the perks of power and fretted that the young didn't understand the discipline





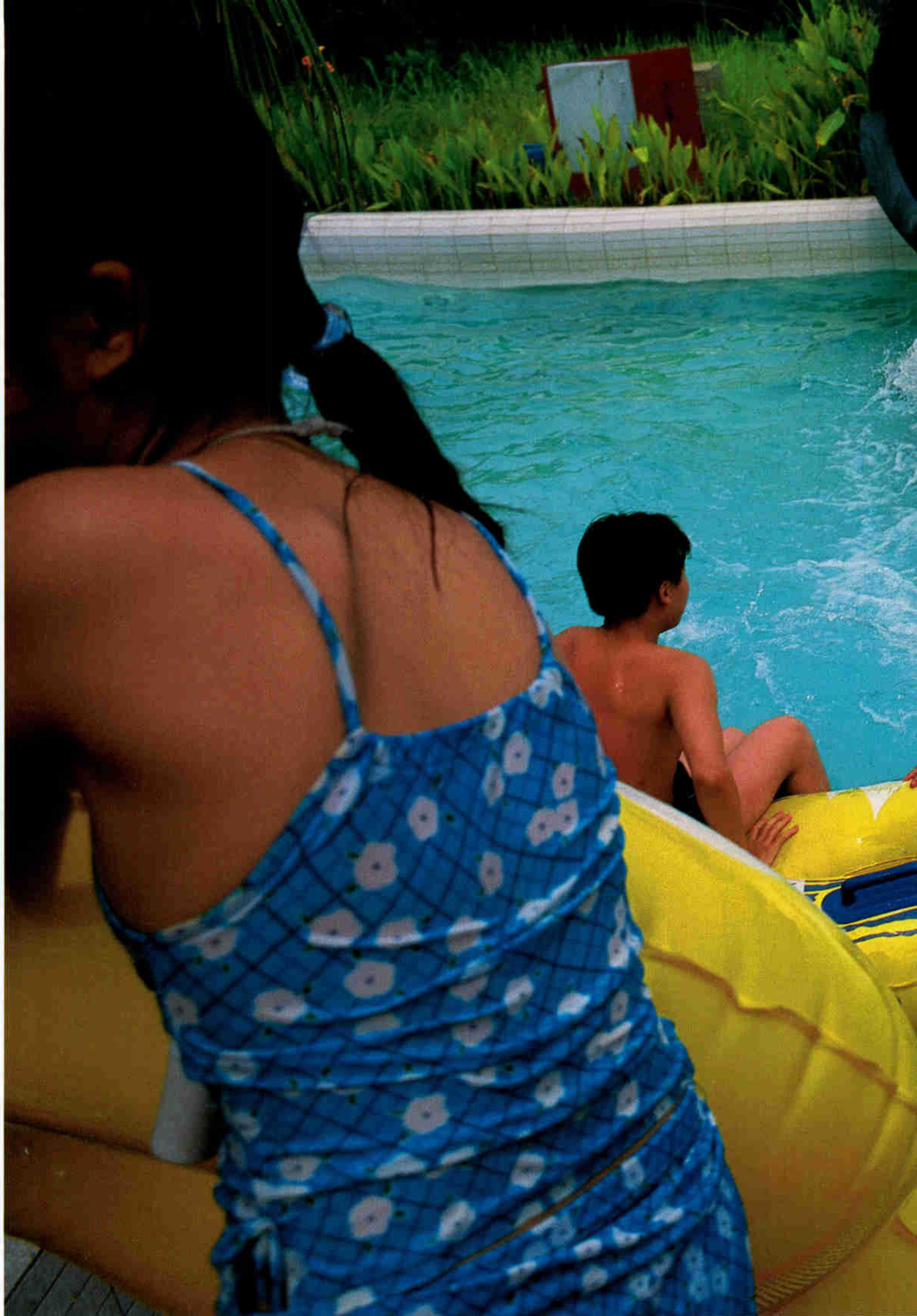
of suffering and sacrifice. Being apolitical for people Hung's age was the safest course.

Now, on a warm evening freed from winter's grip, Hung brought me on the back of his Honda to his favorite *bia hoi*, one of the ubiquitous beer gardens that are tucked in Hanoi's courtyards and spill out onto the sidewalk. I asked Hung if he thought his government would ever loosen its tight controls, which range from press censorship to silencing dissent. "For now stability is the most important thing, so we can catch our breath," he said. "I know what's possible and what isn't. I have the freedom to make some money, to be an artist, the freedom to choose my friends."

Hung, I knew, included me in that circle, and it perplexed me how willing Hanoians were to befriend Americans as though our two peoples had been allies forever. Had they forgotten the

bombs that forced the evacuation of three-quarters of the inner city's population during the war, that leveled the railway station, brought down the houses on Kham Thien Street, killed doctors, nurses, and patients at Bach Mai Hospital? They had not. But they had forgiven. To do otherwise was to let the nightmares fester, and that's not where the promises of peace lay. In the outdoor market where I sometimes bought fresh vegetables, no one seemed to even notice the U.S. B-52 bomber, shot down three decades ago, that protruded from a nearby pond.

When I asked Hanoians why they had let go of their animosity, the usual response was that Ho Chi Minh had often said during the war that the enemy was the American government, not the American people. They'd say Vietnam had always been forgiving of its enemies (and



Hanoi's first and only water park opened in 2000; Ho Chi Minh City (Saigon) already has several. As that larger southern city fills with high-rises and foreign-funded projects, Hanoi moves at a slower pace, hoping to avoid rampant growth that could tarnish its historic identity.





indeed once, in 1426, Vietnamese provided a defeated Chinese army with boats and horses to carry home its soldiers). And they'd acknowledge the practical benefits, economic and political, of a good relationship with the United States.

The best answer, though, came from an ex-North Vietnamese soldier who now drove a taxi. We were headed down Hai Ba Trung Street, past crowded sidewalk cafés and shops stocked floor to ceiling with TVs and electrical appliances. He said: "We fought the Chinese for more than a thousand years, the French for a hundred, the Japanese in World War II." The U.S. was just a moment in the history of a proud nation. In fact, while more than a hundred of Hanoi's 600-plus streets bear names of people or places that relate to struggles against the Chinese and the French, only two commemorated the American War: Liberation Road and Victory Over

B-52s Road. The latter has since been renamed Truong Chinh Street after one of the communist officials who led the uprising against Japanese occupation forces in 1945.

In the Old Quarter, poking along Paper Street on sidewalks so crowded they were almost impassable, I counted 32 likenesses of Ho in a single block. At each shop merchants tried to sell me miniature paper copies of clothes, TVs, electric fans, even beautiful houses, which Hanoians take home or to the pagoda. There the cutouts are burned and sent to heaven to honor dead loved ones. "What the living have, the dead also need," one shopkeeper said. "This isn't superstition. It's about faithfulness and showing serious feeling to your ancestors."

Day and night, in the Old Quarter and the distant reaches of the city, Hanoi's sidewalks are seldom still. At dawn they are commandeered



D. HULCHER

A Hanoi family (left) shares space that is tight by Western standards but would be paradise for the thousands of rural people who come to the city each year seeking jobs and better lives. Children who leave home to make the journey sometimes wind up on the streets.

by badminton players, and sometimes I'd stop my bike at the curb to watch a particularly spirited game. From nearby homes I could hear the opening words of Radio Hanoi's daily broadcast: "Whenever we find ourselves at the four points of the compass, our hearts are turned to Hanoi."

By breakfast time the sidewalks have been claimed by women in conical hats hawking vegetables and flowers, by vendors selling 20-cent bowls of lemon-grass-flavored chicken noodle soup known as *pho ga*—Hanoians will tell you their pho and bia (beer) are far superior to what is produced in Ho Chi Minh City—and by gaggle of motor scooters with nowhere else to park. Everyone is busy: sewing, welding, jackhammering, lugging, selling, cooking, repairing, sawing, building.

This energetic, industrious Hanoi is the only one I have known. It was difficult to imagine

what people here told me: That less than 20 years ago, Hanoi was a miserable, dispirited place, a city where children gathered at night to study under outdoor gas lamps and adults shuffled the streets with slumped shoulders and a look of grim preoccupation. The euphoria of victory had been brief. In many ways winning the peace had proved as difficult as waging the war.

Blame, many people said in private conversations, rested squarely on the national leadership in Hanoi. Its rigid, ideological policies, its collectivization of farms, its confiscation of wealth and property, its repression and arrogance led to a postwar disaster of unimaginable proportions. Inflation neared 700 percent in the mid-1980s. People queued for rice and meat at state stores and went to bed hungry. Famine threatened. Rats scurried through the rooms of the dilapidated Metropole Hotel. The Hanoi Opera House, used for making concrete bomb-shelter casings during the war, was boarded up. The streets fell silent except for the soft whirling sound of bicycle tires on pavement. Virtually the only foreigners around were Russians, whom Vietnamese dismissed as "Americans without dollars." For everyone but the privileged class of communist elite, everything smelled of poverty and decay.

"Hanoi was so impoverished in '84 you could invite only one person from the Ministry of Foreign Affairs to a diplomatic function because there was only one suit at the ministry and people had to share it," recalled a foreign ambassador to Vietnam. "Sometimes an official

would show up wearing a funny-looking coat with sleeves that hardly reached his elbows. He'd be one of the big guys the suit didn't fit."

A few vestiges of those times remain in the city. There are Hanoians who live in grinding poverty, in dwellings that have neither water nor electricity. Migrants flood to the city from the countryside, where 80 percent of the nation's population labors for the crumbs of survival.

In 1986, more out of desperation than desire, the government loosened state economic control and adopted a reform policy known as *doi moi*, renovation. The industrious Hanoians responded with gusto—their entrepreneurial batteries charged by the incentives of a free market economy—and within a decade the inflation rate plummeted to single digits, food production soared, and the national rate of those living in poverty fell dramatically. Capitalistic blood started flowing through the veins of a communist society.

In block after block thousands upon thousands of home owners turned their living rooms into little shops that opened onto the street. Restaurants sprang up, then art galleries. Western tourists trickled in. Foreign investors arrived with two suitcases and no families, liked Hanoi's potential, and sent for their wives and kids. Apartment rents soared. The World Bank set up in a villa, Ford Motor Company built a production plant.

Hoan Kiem Lake, smack-dab in the center of downtown, reclaimed its place as the spiritual heart of Hanoi. People filled the lake's grassy shore before dawn to exercise. Tourists came during the day, and in the evening, Vietnamese families to picnic and young Vietnamese couples to talk of love.

This is the Hanoi that found its way into my heart, a city freshly painted, walking with the swagger of the victorious. It is a city where people rise with the sun and work ten or twelve hours, seven days a week. Young Hanoians, now hungry for education and opportunity instead of for food, finish their day jobs and go to English classes at night. They start on a second

university degree before they've finished the first.

Near Hoan Kiem Lake, the scaffolding around the 93-year-old refurbished opera house came down in 1997. After the building reopened, an audience of VIPs included Vo Nguyen Giap, the legendary general of the French and American wars who was as old as the building itself. The Metropole reclaimed its place as the grande dame of Indochina's hotels after a multimillion-dollar facelift. Down the road Hoa Lo Prison—the "Hanoi Hilton," where the French had held Vietnamese prisoners during the colonial era and Vietnamese had held U.S. POWs during the American War—was demolished, except for several cell blocks saved as a museum. In its place a luxury residential and commercial building rose with a Western-style restaurant, the Red Onion Bistro on the fourth floor. The window tables look directly down on the dark, deserted skeleton of the prison.

In the bar one night I glimpsed a man I recognized from news photos. He was alone, drinking a beer, and staring into Cell Block E, chin in the palm of his hand. Everett Alvarez, Jr., now a tourist, was the first U.S. pilot taken prisoner by the North Vietnamese and had been an inmate at Hoa Lo from 1964 to 1973. Another ghost. I couldn't conceive how the contrast between past and present must have jarred him. I wanted to approach but did not; he deserved the privacy of his memories.

By November temperatures had dipped below 70 degrees. Leaves fell, and Hanoians put on sweaters. Laborers hunkered on Giang Vo Street hoping for a day's work.

In Vietnam there is a saying: "Your face to the earth, and your back to the sun." On the banks of Hanoi's Red River one day I happened upon some young men standing with rolled-up pants and soot-covered faces in shin-deep muck, sweating, shirtless, mixing mud and coal to make the bricks that fuel the crude stoves many Hanoians set on sidewalks outside their homes to cook on. They eyed me as I leaned my bike against a tree, then bent, their backs to the sun, to keep shoveling.

Hoang Van Chat, a 20-year-old high school graduate, said he had left his rural village three years ago because there was no work between rice harvests. Working sunup to sundown, seven days a week, living for free in a nearby

WEBSITE EXCLUSIVE Hanoians have left the horrors of the Vietnam War behind, and American author David Lamb felt warmly welcomed there. He offers reasons why. Share your opinion in our forum at nationalgeographic.com/magazine/0405.



A balcony café offers a spot for repose—still possible to find in a city where stoplights were almost nonexistent just ten years ago. With the growth of Hanoi’s economy in recent years, well-heeled Hanoians now spend time relaxing in trendy restaurants that sprinkle the Old Quarter. What’s next for Hanoi? In 2010 it will celebrate its thousandth year.

shed, he earned the equivalent of two dollars a day, half of which he sent to his parents to help educate two brothers. At night Chat watched TV with friends; on Sundays he strolled around Hoan Kiem Lake. He watched the young couples on the lakeside benches. They were well dressed and in love, and he envied them.

In some ways Hanoi is two cities that live as one. Party officials must cope with an influx of rural migrants like Chat. They must meet the rising expectations of a postwar generation that demands Honda motor scooters instead of bicycles. How do they balance the need for modernization and the desire for preservation in an old city with a young population? How do they deal with increasing bureaucratic red tape and growing corruption that have begun to make Hanoians cynical and foreign investors leery? How does the emergence of a free-market economy alter the social structure of a Confucian society—one that believes community is more important than the individual and one’s worth as a person is determined by one’s public actions?

No one, least of all the government itself, has the answers. But for every problem Hanoi confronts, the city has an asset to build on: Despite widespread poverty, homelessness is minuscule; while drugs are a growing problem among the young, Hanoi’s crime rate is one of the lowest in Southeast Asia; although high-paying jobs are relatively scarce, most Hanoians I spoke with believed their living standards would improve in the year ahead.

When I look back on my years in Hanoi, as I do often, what I remember are not the problems that make the city ordinary but the graciousness and hopefulness and alluring charm that make it extraordinary. Perhaps I was just lucky to have caught Hanoi at a brief golden moment in its history, and 20 years from now people will look back and say with nostalgia, “Oh, you should have seen Hanoi at the turn of the century. It was such a beautiful place.” Or perhaps, as I like to think, the renaissance is a lasting gift, the reward for shouldering the burdens of war and deprivation for so many, many years. □

DANCE



A full-page photograph of a young bull moose standing on a rocky shore. The moose is dark brown with a lighter brown face and neck. It is looking down and slightly to the left. The background shows a calm river or lake under a dark, overcast sky. The foreground is filled with dark, wet rocks.

OF DEATH

WOUNDED BY A PACK OF WOLVES,

a young bull moose confronts a foe
along a river in Denali National Park and
Preserve in Alaska. This face-off was
part of a bloody drama rarely
witnessed by humans.

**TEXT AND PHOTOGRAPHS
BY YVA MOMATIUK
AND JOHN EASTCOTT**



While celebrating at a wedding in Anchorage, Alaska, we got a tip from a fellow wildlife photographer. About a week ago, he said, wolves attacked a moose near the road in Denali and wounded him badly—but did not kill him. If he was still alive, an age-old but seldom photographed scene could soon unfold. Days later, in the chill of a soggy dawn, we found the young bull by the Teklanika River. He was limping from a bloody gash on his right thigh. As a grizzly and her cubs closed in (below), so did the wolves.



The animals were tense,





hyperalert, and could have killed one another.

A RAVENOUS GATHERING

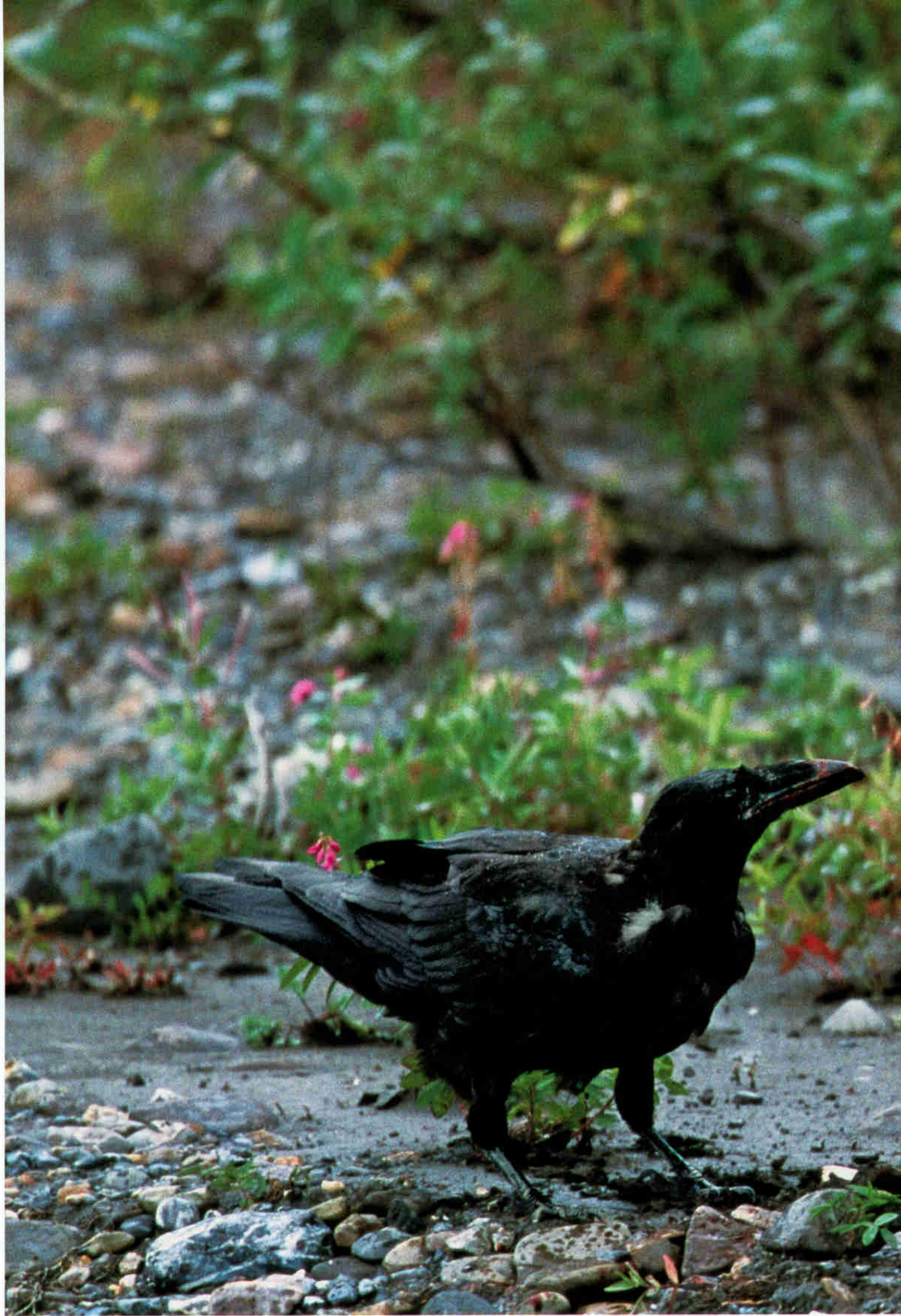
The scent of blood and infection combined with the noisy calls of ravens eventually lured several bears to compete with the six wolves for the prize. Scrambling for position, a female grizzly approached the moose, but when the wolf pack threatened her cubs, she turned to defend them (above).

Running, leaping, pawing, pacing, snapping—all the

animals were tense and hyperalert and could have killed one another. Even the wounded moose was dangerous, lashing out with his feet and antlers. Yet killing him would mean a big payoff. The hundreds of pounds of flesh and organs could provide life-sustaining calories (and the bone marrow a succulent snack) in Denali's cold, barren mountains.

This is how wolves usually kill: One experienced hunter jumps on the moose's rump and gouges its thigh muscles. Another wolf sinks its teeth into the moose's bulbous nose. Others in the pack clench and rip whatever parts of the body they can to help bring down their prey.

Remarkably, this moose had survived the initial attack, battered but not yet beaten.



THE END IS NEAR Slumped among fireweed blossoms, the exhausted moose eyes one of his tormentors. Sometimes called wolf-birds, ravens usually wait for predators to kill



prey, then swoop in to feed on the carcass. Occasionally they will peck at an animal's wounds, harassment that can speed the spiral toward death—and the ensuing life-giving feast.



A wolf closed in. Hunter and

SURRENDER AND SUSTENANCE

All day the wolves stalked the moose, repeatedly forcing him into the frigid river, which sapped his strength. He no longer shook his antlers at his assailants. His protruding ribs rose and fell in shallow breaths. His eyes were sunken and hollow.

In late afternoon the moose scrambled up the bank again to escape the icy water. When a wolf closed in, hunter and

prey locked eyes in what writer Barry Lopez has called the conversation of death. "It is a ceremonial exchange," he writes, "the flesh of the hunted in exchange for respect for its spirit."

Standing nearby we sensed that shift from defense to acceptance. The wolf rushed the moose, who backed into the river and collapsed (above). The current carried him

a hundred feet downstream before two wolves hauled the immobile bull to the shallows. The wolves fed hungrily but were soon chased off by a large grizzly.

By the next morning that bear was gone and the mother grizzly was back, sprawled beside the carcass she had claimed. After eating her fill, she rolled over to nurse her eager cubs (right).

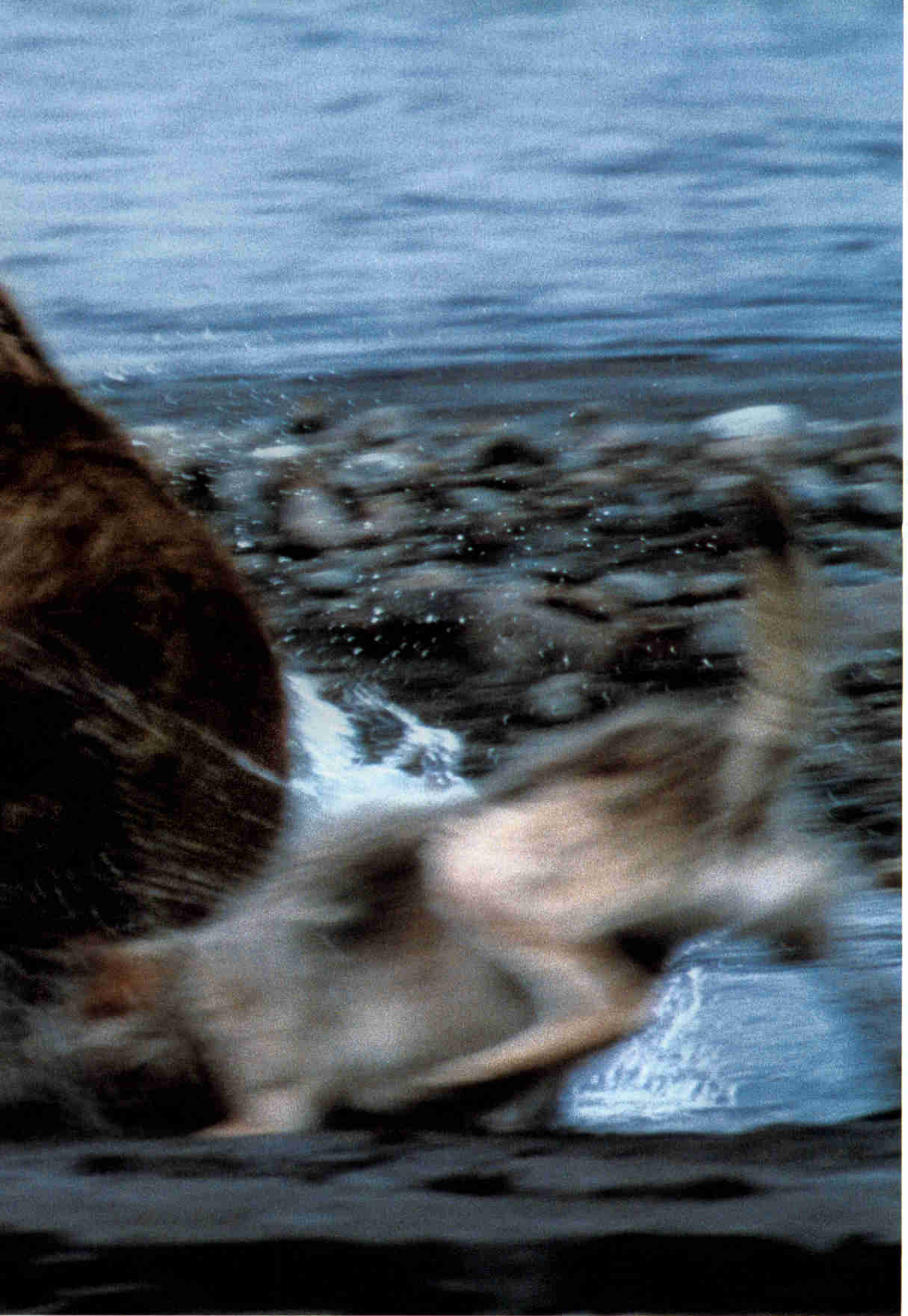


prey locked eyes in the “conversation of death.”





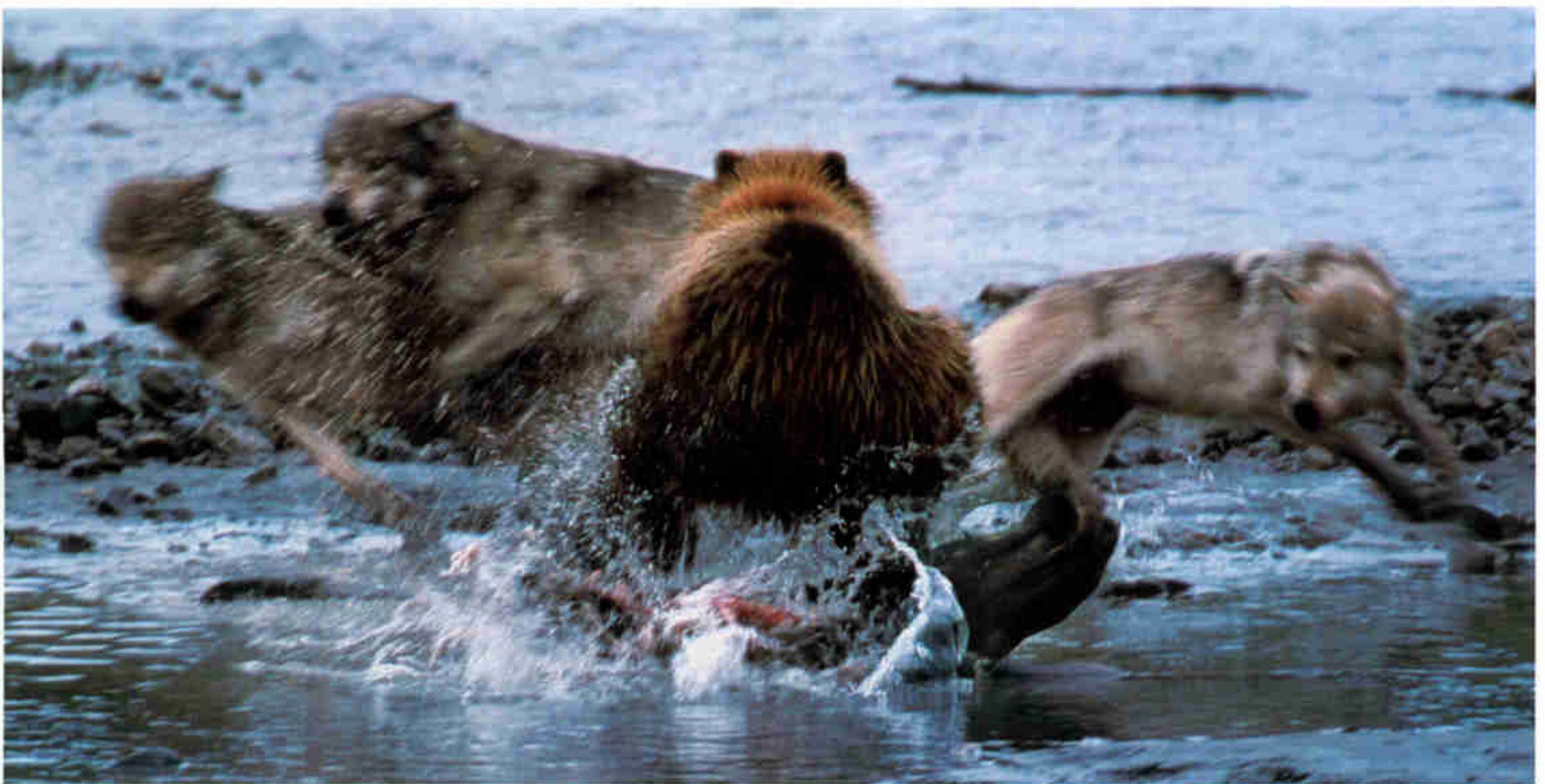
NOT SO FAST After the satiated mother bear and her cubs wandered away, another grizzly approached the carcass—but the wolves quickly attacked from all sides. With teeth snapping



they lunged at his hindquarters, forcing him to spin defensively on his rear. After a few minutes of sparring, the wolves chased the bear away before he could snatch a single bite.



ALL MINE Another bear means another fight—and a near miss—for one adult female wolf (top), followed by a brief, steely standoff (above). When the wolves pounced again as a team,



this young bear repelled their charge. Too fast to be caught and harmed by the grizzly's powerful claws, the wolves persisted, unwilling to fully relinquish their kill.



Such a scene is almost

A COMMUNAL MEAL—AND AN UNSOLVED MYSTERY

As the young bear feasted, the wolves crept closer. They'd brought down the moose but were being kept from their kill. Eyes fixed on the feeding bear, one wolf nibbled the far end of the carcass. Soon other members of the pack began chowing down too, and the bear didn't react (above). It was as if the animals had finally decided, Enough of this dangerous

squabbling, let's eat!

Such a scene is almost never observed, even by seasoned wildlife biologists. Why did these animals end up sharing their food? Was it because most were young and inexperienced? Or was it because the benefits of eating outweighed the risk of fighting over the last scraps?

Once the carcass had been reduced to skin, skull, and

some well-gnawed bones, the bear moved on, leaving ravens to peck at the remains. After two days of turmoil the drama was over at last, and quiet returned to the riverbank.

As the sun broke through the drizzle, a wolf with a full belly strolled away from the kill (right), and so did we—awed by this final episode, yet unable to explain it. □



never observed, even by seasoned biologists.

LIVE OR LET DIE?

Should park rangers have saved the moose? Find out why they didn't, then share your opinion in our forum at nationalgeographic.com/magazine/0405.



Black Sea, 2003: explorer **Bob Ballard**



Mobbed by Turkish reporters, Ballard fields questions about his deep-sea expedition.

has never faced so many problems at once.

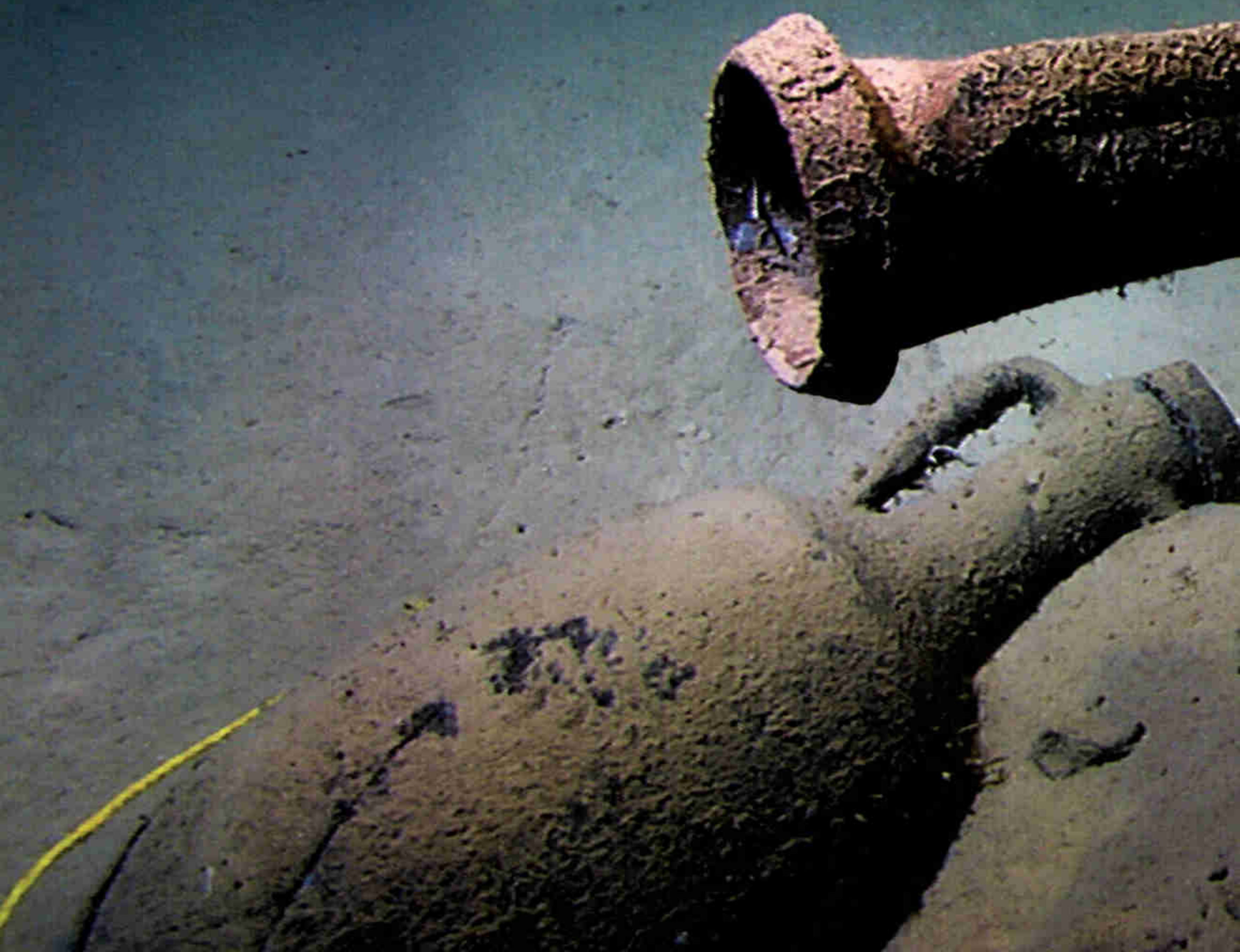


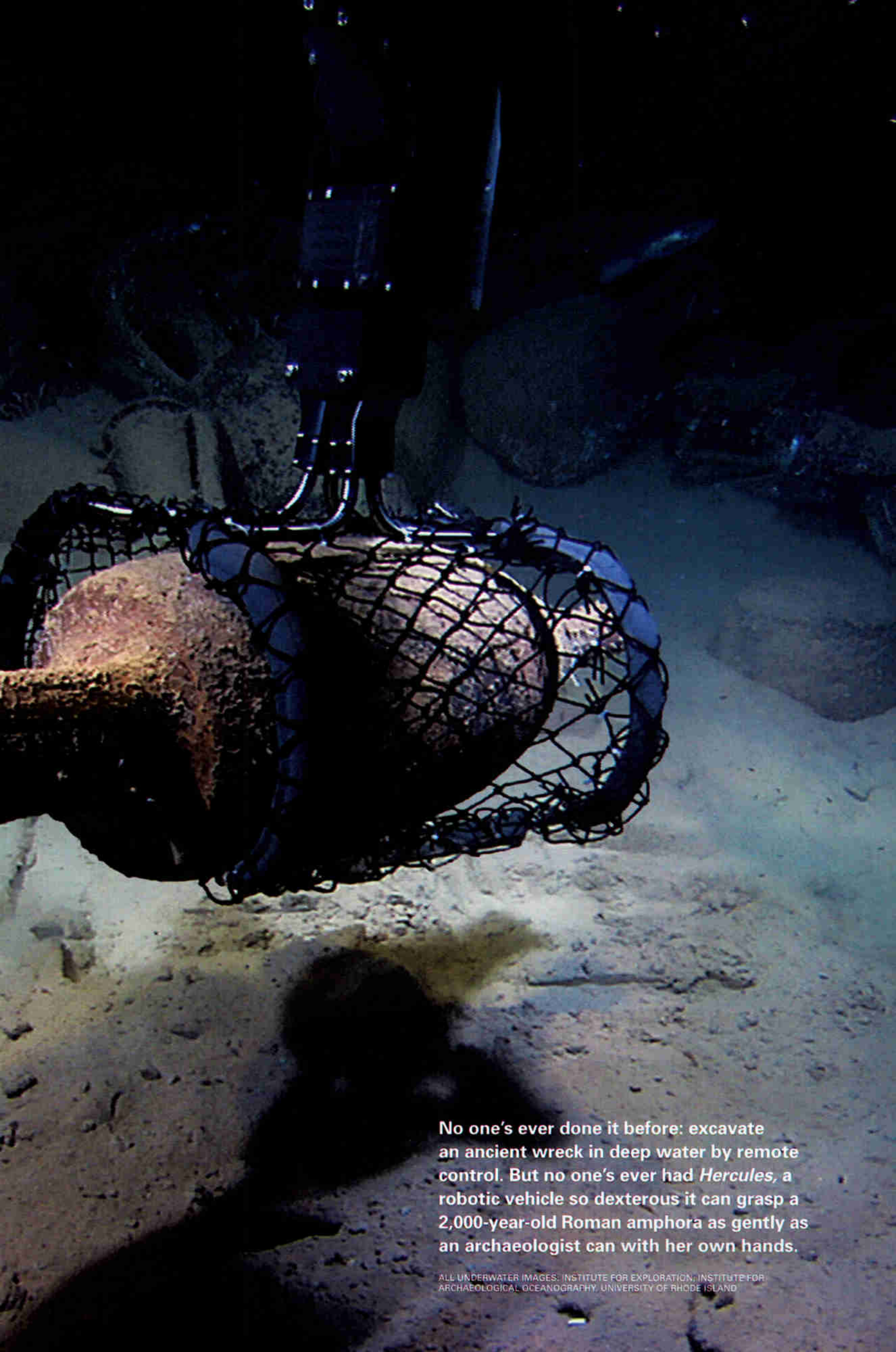
denied
permits
red
tape
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hopes
media
circus
cash
crunch
ticking
clock

meanwhile, 1,000 feet below...

...ancient wrecks await

Ballard has known about these ships for years, vessels scattered across the Black Sea and the Mediterranean that once carried delicious riches such as olive oil, honey, and wine. Now a mechanical hero named *Hercules* just might help him unlock their secrets—if he can only get started.





No one's ever done it before: excavate an ancient wreck in deep water by remote control. But no one's ever had *Hercules*, a robotic vehicle so dexterous it can grasp a 2,000-year-old Roman amphora as gently as an archaeologist can with her own hands.

ALL UNDERWATER IMAGES: INSTITUTE FOR EXPLORATION, INSTITUTE FOR
ARCHAEOLOGICAL OCEANOGRAPHY, UNIVERSITY OF RHODE ISLAND

BY PETER DE JONGE
PHOTOGRAPHS BY
DAVID MCLAIN

For the past 48 hours the 280-foot oceanographic research vessel *Knorr*, temporary if not harmonious home to some 30 engineers, scientists, and academics, as well as a rotating roster of friends and financial supporters, has been lashed to a pier in the northern Turkish city of Sinop, kept from its appointed mission by the lack of research visas. The American ship and crew have come to the Black Sea to investigate ancient shipwrecks, but the local media are skeptical. During the day packs of journalists scramble up and down the stone dock, aiming their cameras and questions at anyone on the deck within earshot.

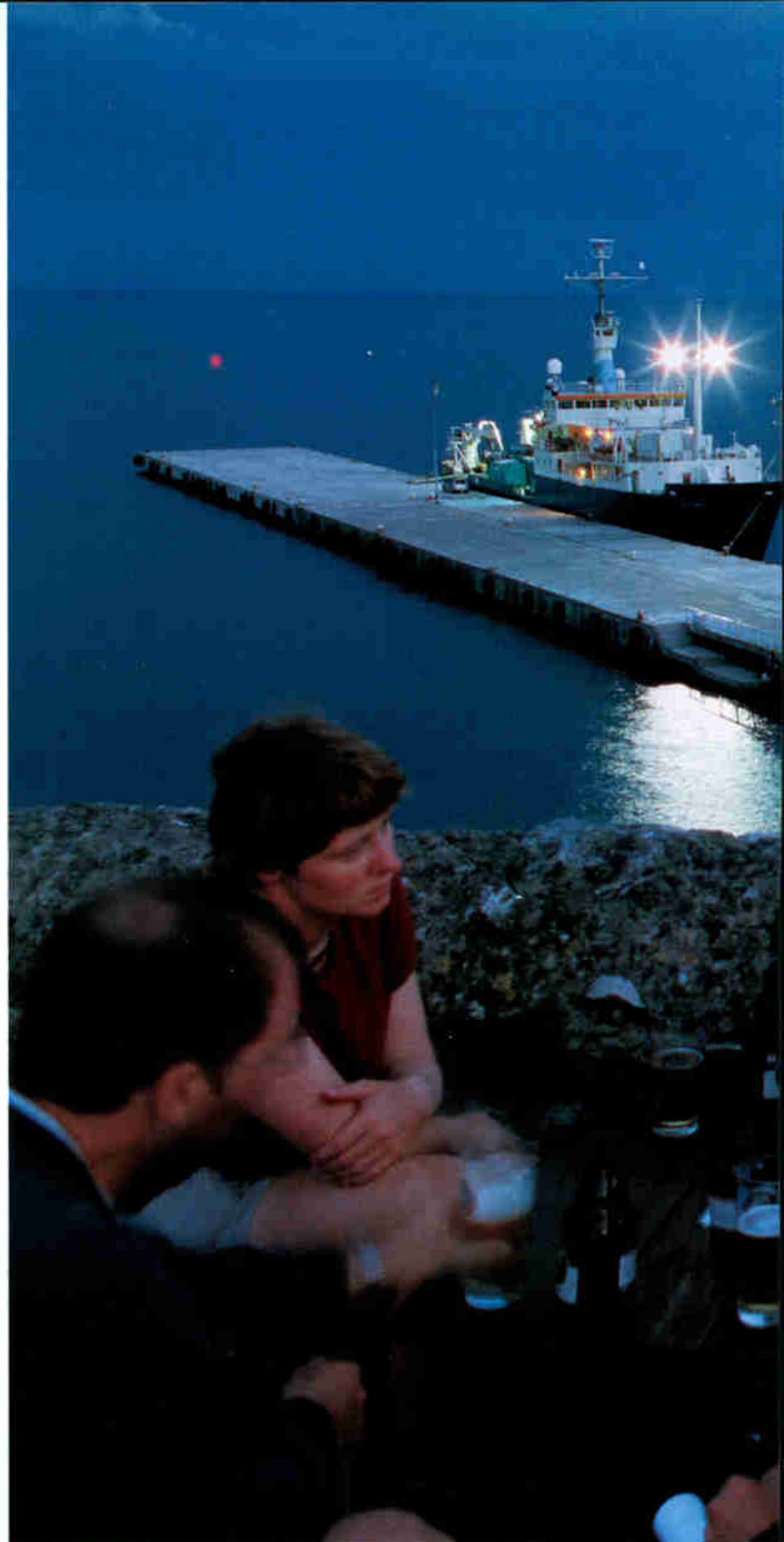
"Why are you really here? Are you searching for oil? Are you on a secret mission for the U.S. military? Are you looking for Noah's ark?"

Hundreds of residents, curious to see for themselves, stroll arm in arm to the waterfront in the lovely late July evenings to marvel at the great ship stuffed with high-tech wizardry bobbing in the bay of their historic walled city.

But for expedition leader Robert D. Ballard, who is spending \$40,000 a day on the project and is losing priceless research time—having invested millions in a state-of-the-art remotely controlled submersible, deep-sea high-definition cameras, and a futuristic high-bandwidth satellite communications system—there's nothing magical about the nightly carnival on the dock.

"We're bleeding to death," he says. "We're hemorrhaging money."

Nor has this latest delay been the only setback of the summer. Ballard's original itinerary called for testing his machines on a series of Greek and Byzantine wrecks off Bulgaria and Turkey before moving on to a pair of 2,700-year-old Phoenician wrecks off Egypt. But weeks earlier, just before the *Knorr* left its home port at Woods Hole, Massachusetts, complications in his negotiations with the Bulgarian Academy of Sciences forced Ballard to scuttle that leg of the cruise for now. Later, after the expedition was under way, Ballard would also get word that



Egyptian security had denied him permission to explore the Phoenician ships.

"Five years of wrecks have been taken off the table in weeks," he says with a sweep of his arm.

For Ballard, a restless, 61-year-old oceanographer whose role models skew toward explorers and mountain climbers—"I believe in the Hillary approach," he says, "climb the mountain, plant the flag"—the only thing worse than the wasted money is the diminishing prospect of realizing a personal dream. This is the summer Ballard intended to plant the flag for a new multidisciplinary approach in which the worlds of maritime archaeology and oceanography would merge. Ballard's plan calls for remotely controlled vehicles to

■ SOCIETY GRANT

This Expeditions Council project was supported by your Society membership.



carry out the careful excavation of deep-sea wrecks, and for their activities to be broadcast live via satellite to scholars and students back on the beach over Internet2, the next-generation network not yet available to the public. Once the kinks are worked out, research vessels laden with ROVs would begin systematically searching the deep for wrecks of antiquity.

If Ballard were a patient man, he would never have accomplished half of what he has. But this is especially exasperating. After raising the necessary funds and recruiting brilliant engineers to design and build his advanced hardware, here he is, twisting in the wind on a Turkish dock, thwarted by the lack of an official seal on some paperwork.

Then again, Ballard, whose detective grandfather was killed in a gunfight in Wichita,

held at bay

The research vessel *Knorr* idles in Sinop, Turkey, awaiting permissions while expedition members visit a café (above). Ballard stays aboard to avoid local reporters (below). When he finally holds a press conference, they ask, "Is it true you're here for oil?" "Yes," Ballard says, "1,500-year-old olive oil!"



Kansas, has always relished the pressure of working on a new frontier. On this same ship in the North Atlantic in 1985 he was down to the last days of a search when a tethered imaging sled called *Argo*, dangling on a cable 12,000 feet down, passed over debris from *Titanic*. He was fighting against time again when he found the German battleship *Bismarck* in 1989, the U.S. aircraft carrier *Yorktown* in 1998, and JFK's *PT 109* in 2002. And during a dive in a bathyscaph 9,200 feet below the surface in 1973—in which he and two others survived an electrical fire—he became only the second scientist to observe the mysterious Mid-Atlantic Ridge, helping to prove the theory of plate tectonics.

Through a combination of imagination, persuasion, and nerve, with support from the military, Ballard has pulled off the enviable feat of

doing pretty much exactly what he's wanted to for 40 years. As an officer in the Navy he convinced the chief of naval operations that the same technology he was developing for exploration and science could be applied to deepwater military operations. As a result, the Office of Naval Research helped fund the development of his early ROV systems. The Navy also assigned him to conduct classified missions such as mapping and videotaping the lost U.S. nuclear submarines *Thresher* in 1984 and *Scorpion* in 1985—allowing him to piggyback his search for *Titanic* on the *Scorpion* mission.

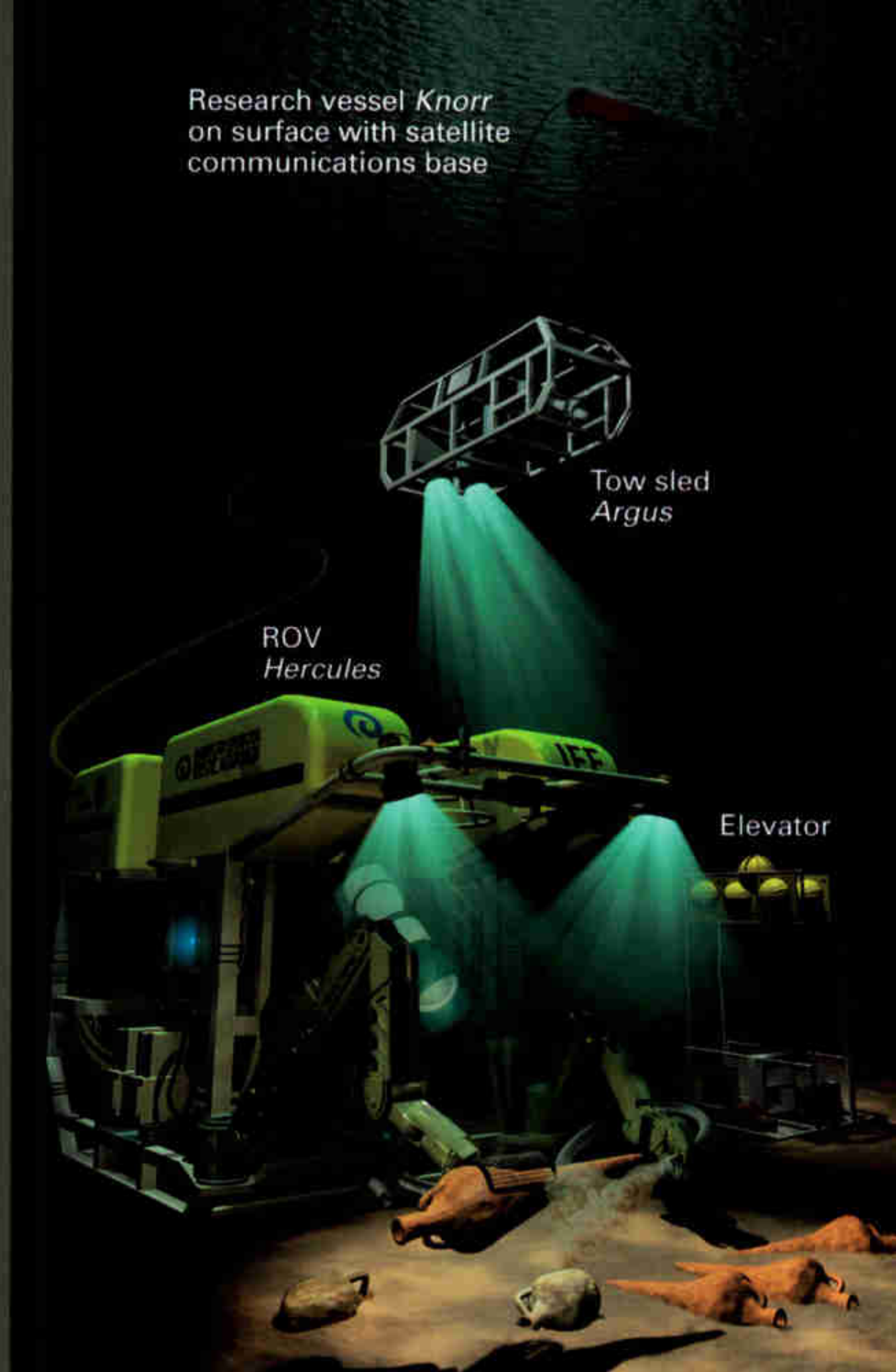
Now that those secret military operations are a matter of public record, you can hardly blame the media in places like Turkey and Egypt for wondering what Ballard might be up to when he sails into their waters in a vessel bristling with



advanced electronics. This time not even the U.S. State Department can help him.

Luckily for Ballard, however, the local security chief and provincial governor in Sinop are also creative problem solvers, persuading the Foreign Ministry in Ankara to issue a waiver for the research visas. At the same time, customs officials declare everyone on board a temporary resident of Sinop—for a modest fee of \$150 a head. After Ballard gives the governor a courtesy tour of the ship, the *Knorr* finally escapes the pier and steams out of the bay.

Within hours the ship is on station off the Turkish coast and the crew prepares to lower *Hercules*, Ballard's bright yellow refrigerator-shaped ROV, over the side to check out a target called site 82. Three



high-res research

Ballard found the wreck-rich areas in the Black Sea and Mediterranean on previous expeditions. Now he had the technology (above) to do them justice, including tow sled *Argus*, which carries lights and cameras, and an elevator platform that ferries finds up to the research vessel *Knorr* to free *Hercules* for more important work.

Most exciting: the project's "telepresence," providing real-time transmission of high-resolution seafloor video to both the *Knorr*'s control console (left) and—via satellite and ultra-high-bandwidth

Internet2 connection—to U.S. scientists some 6,000 miles away. Ballard first envisioned such remote imaging in 1981. "It's 'you are there' technology," he says, "without you being there at all."





summers before, Ballard and archaeologist Fredrik Hiebert of the University of Pennsylvania Museum had discovered stones in a rectangular pattern here, speculating that they might belong to a dwelling dating back 7,000 years. That was the era when some scientists believe the Mediterranean breached the Bosphorus and, in a flood of biblical proportions, turned what had been a freshwater lake into the Black Sea. Now they are looking for further proof.

On the aft deck, mechanical engineers Todd Gregory and Sarah Webster, both blond and twentysomething, buzz around the decalfestooned *Hercules* like a NASCAR pit crew. Webster makes last minute adjustments on the clear Lexan tubes that will be used to take samples of the bottom, and Gregory, who is also a pilot of the ROV, does a quick check of the vehicle's \$150,000 manipulator arm.

Twenty feet away behind the closed doors of the deck lab, the expedition's computer brain-trust, an unnerving percentage of whom have Ph.D.'s from MIT, hunch cheek by jowl over their laptops, testing and tweaking the ever evolving software that will help navigate the ROV, spit out maps, and organize reams of data. Dana Yoerger, head of the Deep Submergence Lab at Woods Hole Oceanographic Institution, which helped develop *Hercules*, and David Mindell, a 37-year-old MIT professor and inventor of a narrow-beam sub-bottom profiler that can survey wrecks buried a few feet deep below the seafloor, are sitting back to back.

"Everybody here in almost every billet is about as good as you can find," says Yoerger, a veteran



of 14 Ballard expeditions. "If they're not the best in the world at what they do, they're number two or three." At the other end of the room, Hiebert and his research assistant, Julie Hanlon, ready the makeshift lab where the core samples will be processed and analyzed.

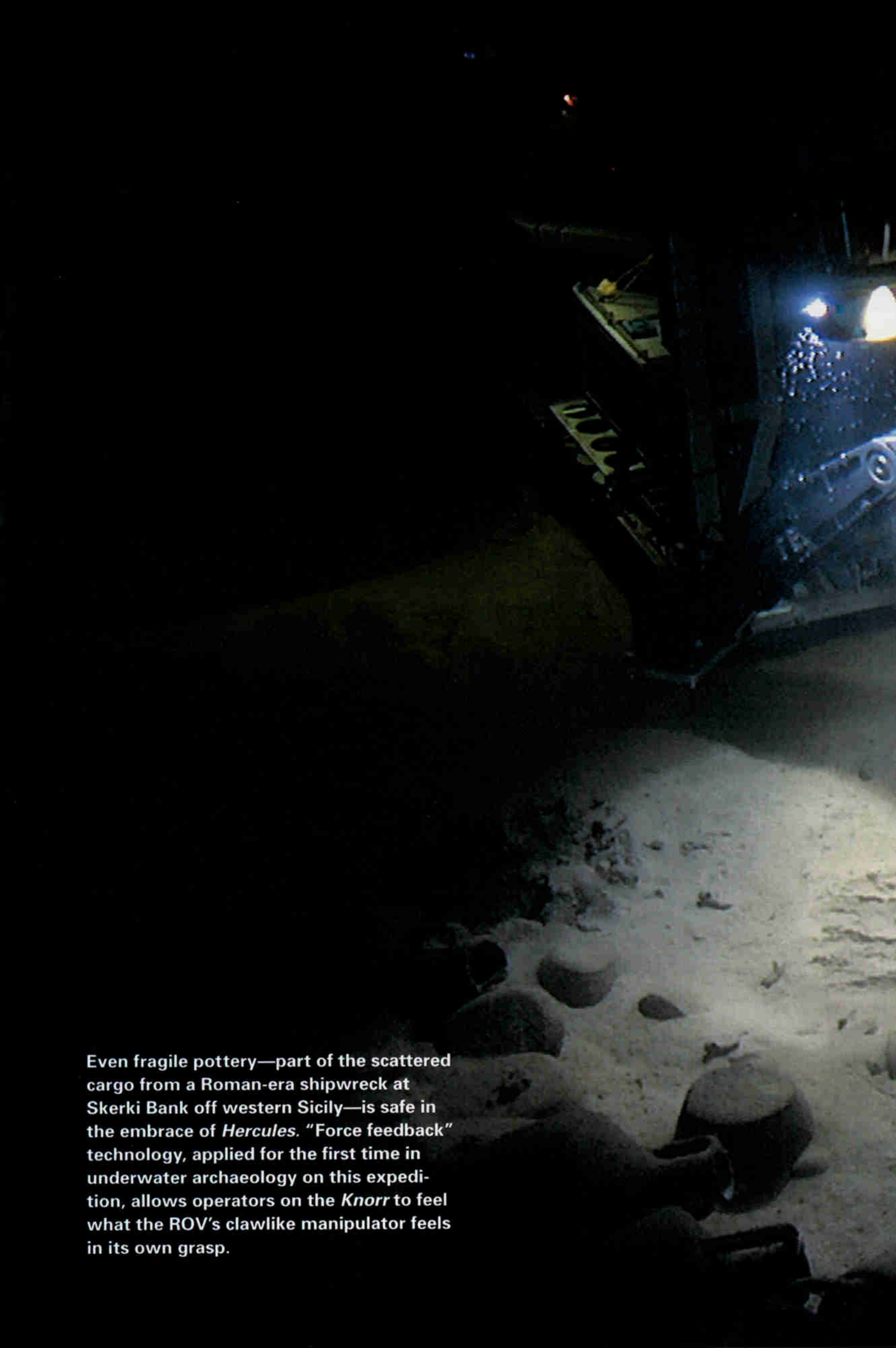
While the engineers and academics scurry on the deck like cerebral galley slaves, Ballard sits directly above them in his million-dollar control room, a headset resting rakishly atop his brown expedition cap. Now that the work is finally under way, he evinces a manic glee, alternately belting out Sinatra's version of "On the Road to Mandalay" and Allan Sherman's "Hello Muddah, Hello Faddah."



labors of *Hercules*

A thousand feet beneath the Black Sea in a zone starved of oxygen, a thick frosting of silt covers a 1,500-year-old shipwreck, barely hinting at what lies beneath. Transmitting continuous images to scientists on the *Knorr* as it explores the early Byzantine wreck, *Hercules* vacuums away centuries of sediment (top left) to reveal a shipwright's rough adze marks (above). The ROV's mechanical "hands" apply the precise amount of pressure needed, from gently lifting an amphora (left) to spinning a paintbrush car wash style (below) against a jutting beam. Says nautical archaeologist Cheryl Ward on board the *Knorr*: "This is the best preserved shipwreck from the ancient world."



A deep-sea ROV, identified as the Hercules, is shown in a dark underwater environment. The ROV's body is metallic and complex, with various mechanical components visible. A large, dark, claw-like manipulator arm extends from the ROV, reaching down towards the seabed. The seabed is covered in fine sand and scattered with numerous pieces of ancient pottery, including fragments of bowls and plates. The ROV's lights illuminate the scene, creating a bright area around the manipulator and the debris on the seabed. The overall atmosphere is one of careful archaeological excavation in a remote, deep-sea location.

Even fragile pottery—part of the scattered cargo from a Roman-era shipwreck at Skerki Bank off western Sicily—is safe in the embrace of *Hercules*. “Force feedback” technology, applied for the first time in underwater archaeology on this expedition, allows operators on the *Knorr* to feel what the ROV’s clawlike manipulator feels in its own grasp.



Flanking him at the cherry-finish console, facing a wall of 50-inch flat-screen plasma monitors, are two of Ballard's personal guests: Jack Orben, an investment adviser from New York, and Garry Weber, a counterpart from Dallas who starred on the gridiron at SMU before making a killing in stocks. As they follow the action on the monitors, *Hercules* makes a gentle landing on the rocky bottom about 300 feet down at site 82. Reaching around its side with the manipulator arm, *Hercules* plucks one of the tube cores from a holster made from a milk crate and attempts to push the tube into the sea-floor. As the tube bumps against the bottom, the pilot operating *Hercules*, seated on the other side of the control room, can actually feel the resistance through the joystick in a technological advance called "force feedback."

The goal is to collect a sample from about seven inches down, where researchers hope to find signs of ancient habitation. But the rocks and shell hash on the ocean floor prove too tough for the cylindrical cores to penetrate cleanly, and so the team switches to a different instrument to sample sediment lying on top of the bedrock. Before leaving the site, they also collect a log and a stone block for later analysis.

Next the expedition drops in on two early Byzantine shipwrecks, where the team retrieves sample amphorae and maps the sites using the high-definition cameras. Then it's on to the deep-water prize, a sixth-century Byzantine cargo vessel, dubbed wreck D, which has lain waiting in the soft mud for 1,500 years, its mast still standing as if the ship has just gone down. Excavating a deep ancient wreck by remote control has



never been attempted, and on the evening when Gregory, flanked by Webster and Cheryl Ward, a nautical archaeologist from Florida State University, tilts his joystick forward and sends *Hercules* on its descent, space in the darkened theater of the control room is standing room only.

"If I knock over the mast," Gregory tells the hushed throng following the action on the monitors like sci-fi pay-per-view, "I apologize in advance." This amuses his colleagues, but not Huseyin Vural, the anxious 28-year-old from the Turkish Ministry of Culture charged with safeguarding his country's heritage.

Gingerly sidling *Hercules* up to the 39-foot-long wreck, Gregory activates a sophisticated water jet and suction device on the ROV designed by Webster and named Snuffleupagus—after the woolly mammoth-like *Sesame Street*



by the time Ballard realizes one vision, he's already hatch- ing the next

A sailor with a farmer's tan, Ballard cools off (left) in a deck-top tank. Once the *Knorr* is on site, such relaxation is rare. To make the most of every minute on the seven-million-dollar expedition, six teams of operators worked four-hour watches round the clock to keep *Hercules* busy. On this, its Black Sea shakedown cruise, the ROV collected 3-D sonar data for each wreck and excavated a few amphorae for later analysis. Conservator Dennis Piechota (above) prepares the artifacts for transport to the Sinop Museum.

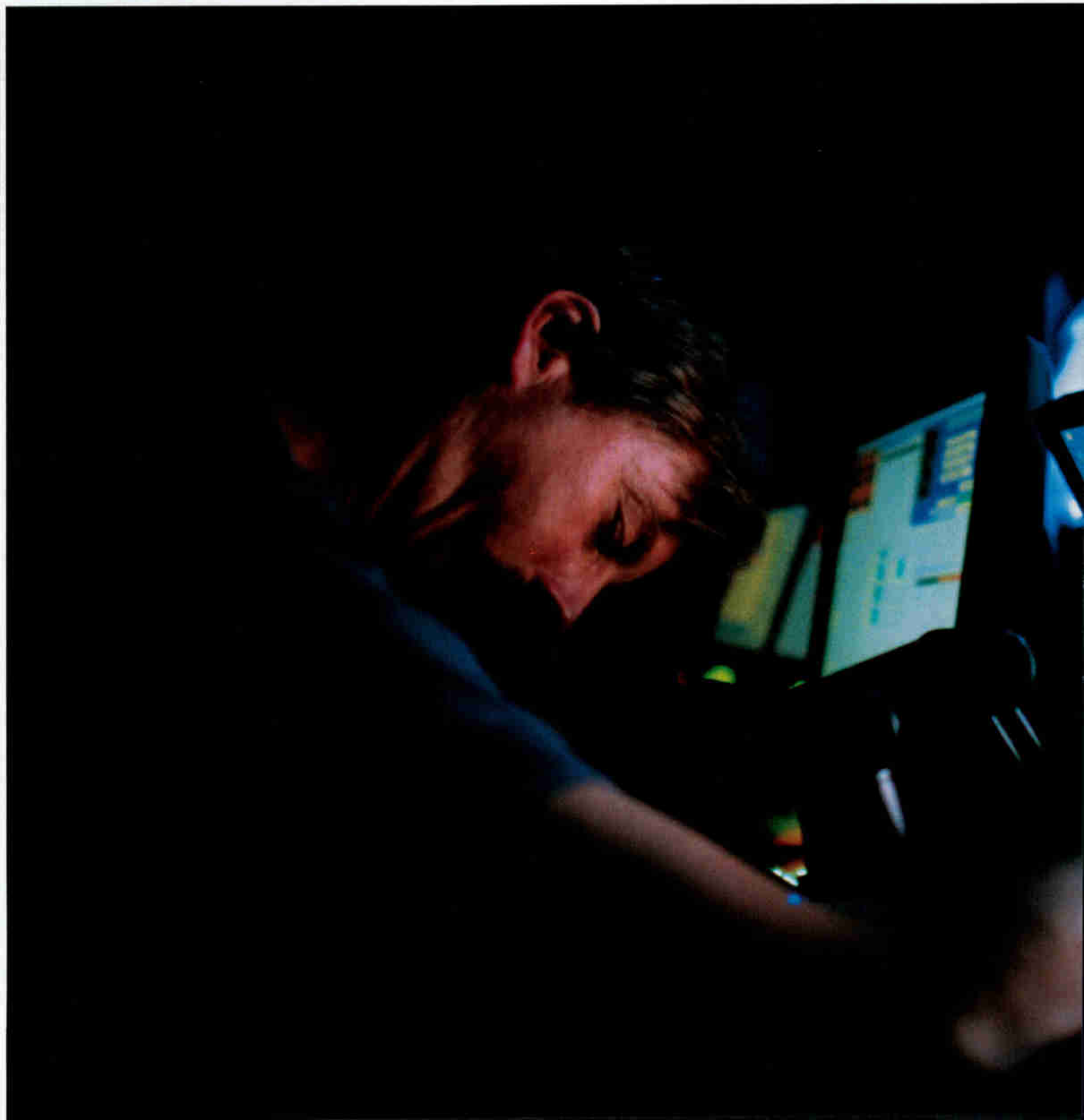
character—and *Hercules* begins snuffling the gelatinous muck off the amazingly well-preserved wood. If the ROV kicks up too much mud, obscuring Gregory's view, he can still operate acoustically, using three-dimensional ultrasound sensors on *Hercules* to peer through the dark. This time they aren't needed.

"Sarah designed her nozzle so well it sucks up the dirt as soon as it's dislodged," Ballard says. "It's absolutely elegant, like watching someone play a musical instrument."

Eventually a large stash of amphorae comes into view, 15 centuries falling away like magic. As Ballard has hoped, the level of preservation provided by the anoxic layer is such that you can still see the beeswax splatter formed when the jugs were sealed on an ancient dock. Indeed, every key facet of the operation, from the

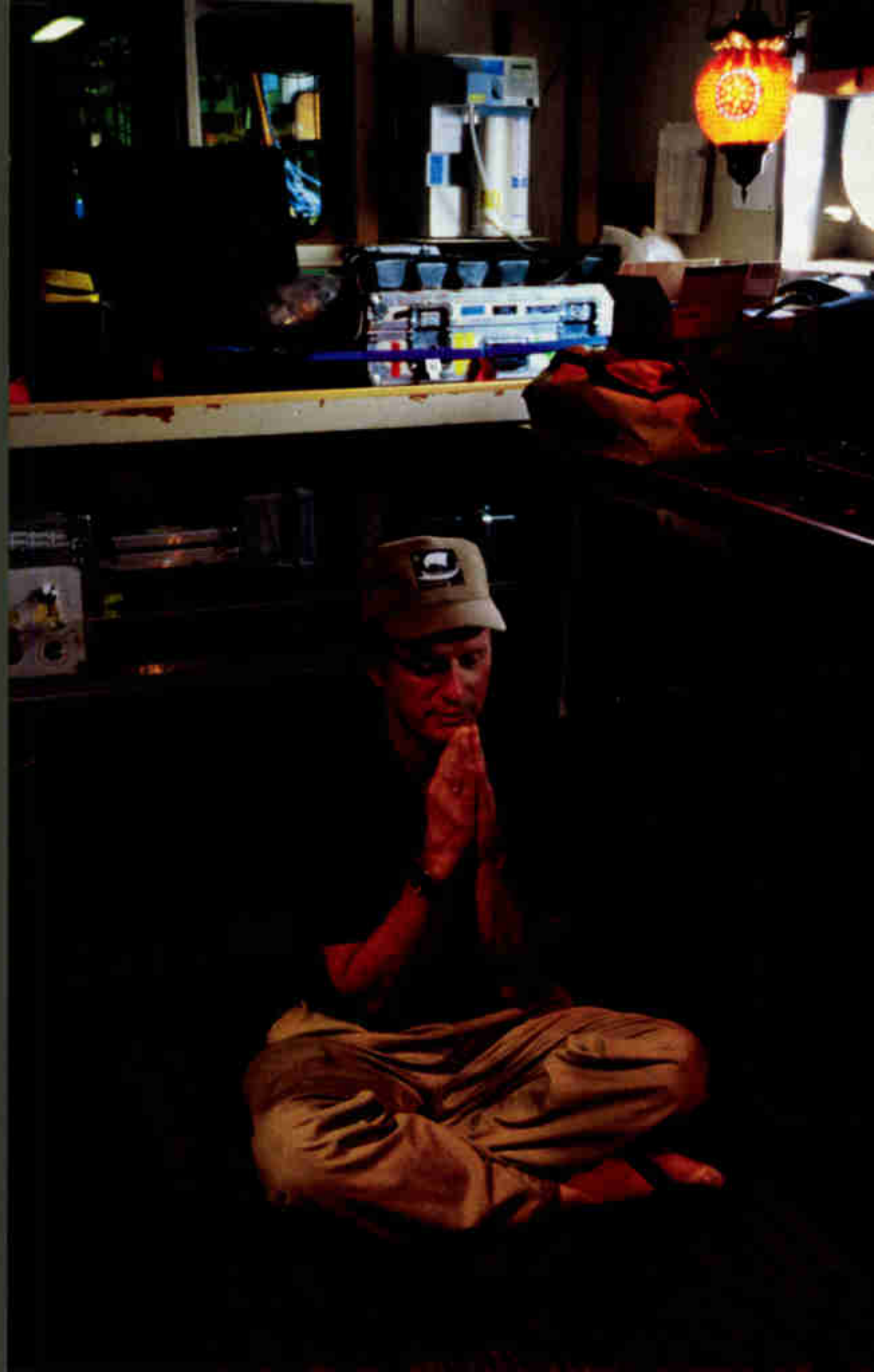
surgical delicacy of *Hercules*' mechanical arm to the movie-set lighting provided by the trailing sled *Argus* to the dazzling clarity of the high-definition images broadcast live via satellite, has unfolded pretty much as Ballard envisioned 22 years before in the December 1981 issue of NATIONAL GEOGRAPHIC.

Watching the big plasma screen is like looking out the window of the *Nautilus* in Jules Verne's *Twenty Thousand Leagues Under the Sea*, the science fiction classic that inspired Ballard as a boy to dream of peering into the deep. And yet on this night Ballard is the least transfixed spectator in the room. Sitting in the back with Jack Orben, he fidgets and jokes like an unruly student disrupting his own class.



It's not just the glacial pace of the fieldwork that has him crawling the walls. For Ballard, a compulsively restless visionary, the present itself holds scant interest. By the time he realizes one vision, he is already hatching the next one or the one after that. Even as *Hercules* makes archaeological history, performing the first remote excavation of a deepwater ancient wreck, Ballard, at least in his head, has already moved on.

In any event, the clock has run out for the work at wreck D. Because of the days lost in Sinop, when the *Knorr* was tied up in red tape, Ballard now has no choice but to blow the whistle on his team just as they're hitting full stride. Over the objections of several researchers, who plead for additional time to keep excavating, Ballard orders the *Knorr* to leave the Black Sea on schedule and head for Istanbul, where a new



if Ballard were a patient man, he wouldn't have accomplished half of what he has

"Every twitch of my hand gets amplified by *Hercules'* arm down on the wreck," says ROV engineer and pilot Dave Wright, who steals a moment to stretch (left). Like many on board, Wright is a veteran of Ballard expeditions. "Bob's mellowed," he says—though perhaps not as much as a yoga pose on the galley floor suggests (above). "He throws out a million ideas a second for us to work on, then comes back later with brand new ideas."

group of researchers and a National Geographic film crew are waiting to come aboard.

Even now Ballard is still hoping for permission to work on the Phoenician wrecks. But when that doesn't come by the time the *Knorr* leaves Istanbul, he decides with National Geographic on a backup plan. Instead of sailing south toward Egypt, the expedition will head west toward Sicily, where six years earlier Ballard had discovered a string of Roman-era wrecks in deep water just north of a submerged reef called Skerki Bank. There the team can put *Hercules* through its paces on the harder clay of the Mediterranean, researchers can survey the area to determine why so many vessels wrecked there, and the film crew can document it all.

It's the kind of decision in the field only Ballard would make. Juggling the aspirations and abilities of his research team with the goals and demands of his sponsors, Ballard is constantly generating options, which is his way of ensuring that no setback will cost him too much. It's a pattern he's followed in his own career as well, never allowing any agency or institution to gain too much leverage over him, whether it's Mystic Aquarium in Connecticut, home of his Institute for Exploration, or the University of Rhode Island, where he recently established the Institute for Archaeological Oceanography, or the National Geographic Society, where he is an explorer-in-residence. If his latest proposal to one organization doesn't succeed, there's always another to back him up.

Exploring the Roman ships might have provided Ballard's team with yet another high-tech coup and even redeemed their high hopes for the summer, but they wouldn't get the chance. Soon after *Hercules* slips into the Mediterranean, its main hydraulic pump fails. A replacement pump is personally escorted from its manufacturer in Vancouver, but less than a day after *Hercules* is put back in the water, the ROV fails again. Using *Argus* and a smaller ROV, the team spends two days imaging a pair of wrecks, doing some filming for the TV crew, and surveying the Skerki Bank for new targets. But the momentum is gone, and Ballard announces the cruise is over. Some expedition members see the broken pump as another example of the bad luck that has dogged the *Knorr* all summer. Others feel it was lucky that the barely tested *Hercules* held up as well as it did.



In the end, the summer has turned out to be a sobering one for Ballard. For all the successes of his latest technology, his grand plan to excavate shipwrecks of antiquity in the deep sea has gotten off to a rocky start. In countries where he or his researchers have worked before, officials have suddenly thrown up barriers. Permission to work in Bulgaria: postponed. Permission to work in Turkey: delayed. Permission to work in Egypt: denied.

To some Ballard observers—especially more traditional academics who question his expensive, high-tech, media-savvy approach to archaeology—such problems are the result of an inevitable clash between Ballard's full-speed-ahead style and increasingly strict demands of governments on all marine archaeologists.

To Ballard, on the other hand, this summer's



difficulties reflect a broader shift in global political realities after the war in Iraq.

"As a result of the war there's a new landscape and it's going to affect my thinking about where we do future research," he says a couple months later. "Clearly the world has changed."

Then again Ballard, whose best ideas tend to be about 22 years ahead of their time, is accustomed to sailing upwind. He's already scheduling expeditions through 2005 and beyond, including plans to send *Hercules* and the other ROVs twice as deep as originally designed. For Bob Ballard the fun's just getting started. □

WIRED TO THE HILT: That's how photographer David McLain describes the research ship *Knorr*. Get the behind-the-scenes scoop on high-tech triumphs and failures in a multimedia interview at nationalgeographic.com/magazine/0405.

broken dreams

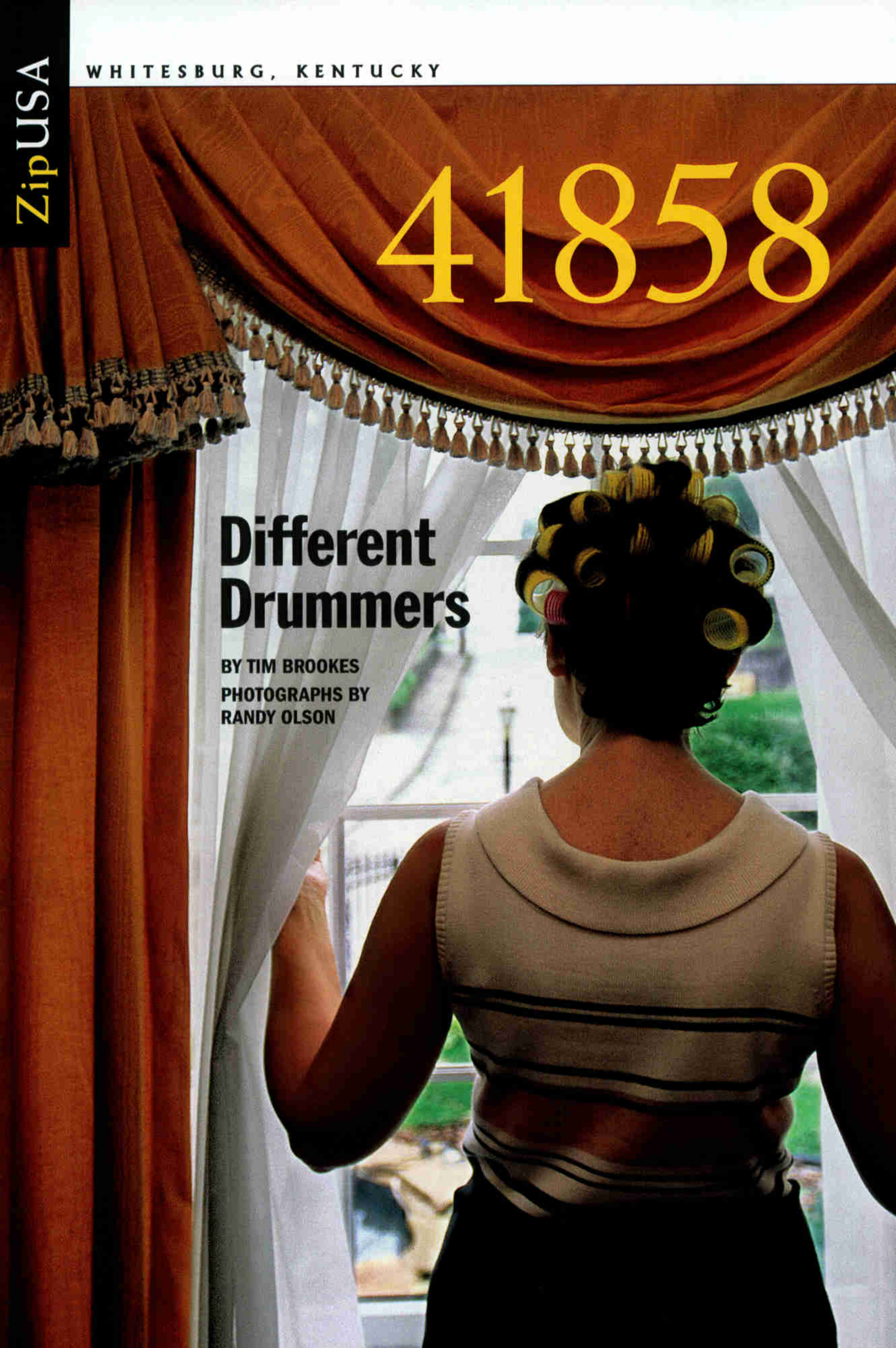
***Hercules'* hydraulic pump failed soon after arrival at Skerki Bank. One costly repair and a few precious days later, it failed again (above). The team's work done for now, Ballard (below) breaks the news: The expedition that started late would end early. "Some cruises," he says, "are more painful than others."**

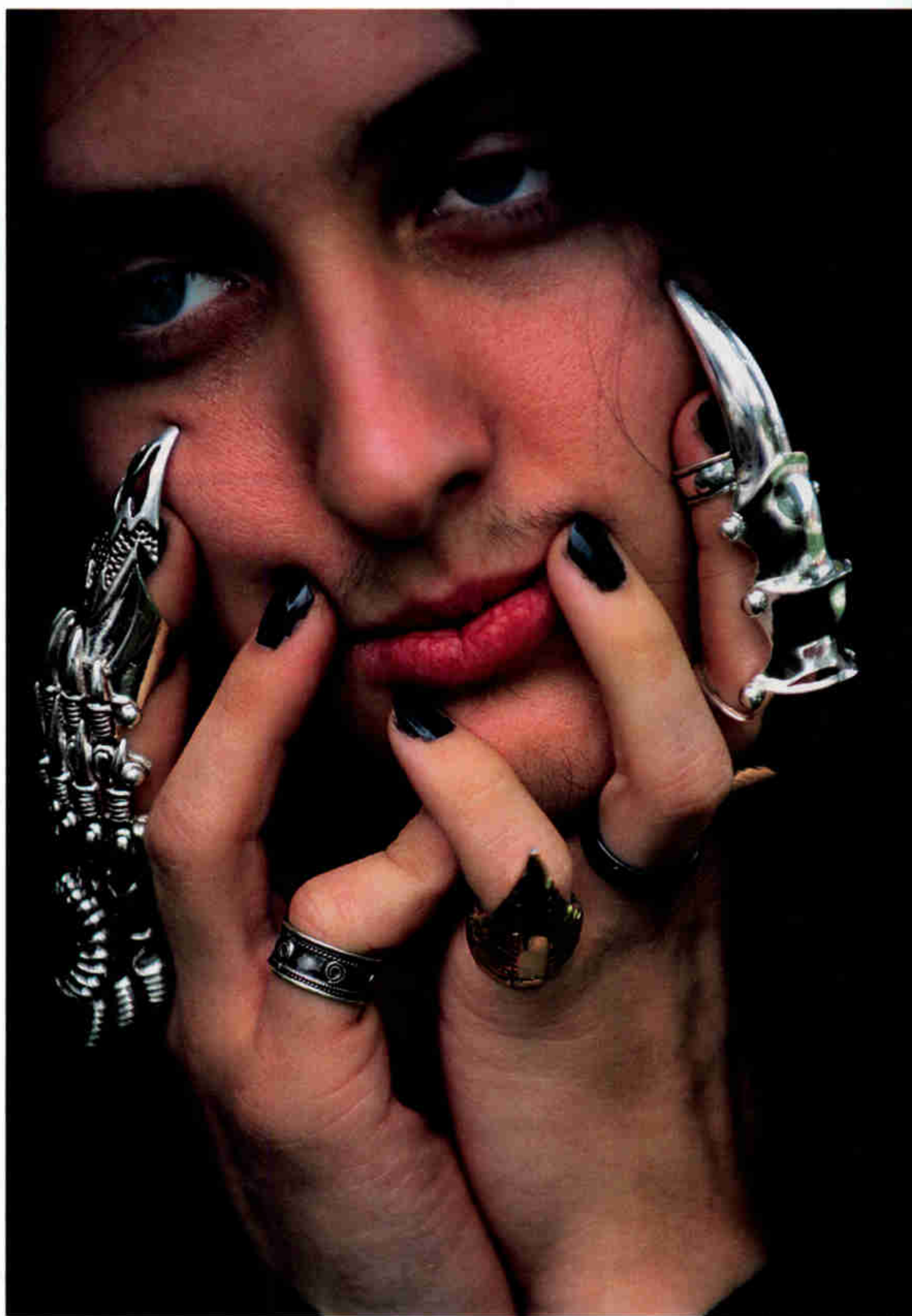


41858

Different Drummers

BY TIM BROOKES
PHOTOGRAPHS BY
RANDY OLSON





One morning at the B&B she manages, Delta Craft (left) noticed photographer Randy Olson eating breakfast by himself. Despite her curlers—and the risk of public exposure—she joined him. Hospitality first, says Delta. Wearing finger armor and nail polish, Nat Handloser and his Christian metal band, Simeon, run their own risk. “Our message can get lost because of our dress,” says Nat, “so we start our show with a prayer.” Bands like Simeon get a warm welcome in Whitesburg, a regional mine for a mother lode of music.

WHITESBURG, KENTUCKY



“Whitesburg is dying,” the doctor says. He should know. His office on Main Street is between two funeral homes, each with a board out front posting the names of the deceased. “If you’re new in town,” he warns, “you have to watch out for little old ladies who stop their cars here, right in the road, to see who’s died.”

At first glance, the doctor’s diagnosis seems accurate. The decline of strip mining has left the Kentucky town with fewer jobs, a failing local economy, a desecrated landscape. But it turns out that this town is a tough patient, accustomed to hard times. So with the coal jobs gone, Whitesburg is turning to another old Appalachian resource: music.

One Friday evening, in a community center several miles up a winding hollow, 75-year-old Lee Sexton, a large man in plaid shirt and suspenders, is unpacking a Gibson Mastertone banjo so well worn that in places its skin is transparent. He settles into a hard chair in front of the fireplace and begins to warm up for a square dance.

Sexton, a featured performer in last year’s Smithsonian Folklife Festival in Washington, D.C., learned banjo as a boy. His first instrument was a wooden fretless one that cost a dollar. “It had a groundhog hide on it,” he says, “and they’d left the tail on.” Growing up in Whitesburg, he worked in the coal mines during the week and played banjo weekends at bean stringings, log rollings, and corn shuckings, sometimes playing until his fingers bled.

Here in the hill country that helped give birth to bluegrass and country music, interest in those traditional forms declined in the 1950s and ’60s. “Old-time music like to went out at one time,” Sexton says. “People quit playing it. It was just about forgot about.” The turnaround in Whitesburg started ten years ago when a group of volunteers began a monthly old-time jam session and began teaching kids the music. Now Sexton is in demand, performing at high schools and colleges around the United States. “There’s a heck of a lot of younger people taking that old-time up,” he says. “Man, they just eat it up, buddy. They can’t get enough.”

Main Street isn’t bustling, but at least it’s breathing, despite competition from a nearby Wal-Mart. Founded in 1842 at the North Fork of the Kentucky River, Whitesburg began as a logging camp. By the 1920s coal was king. Then the Depression hit, and the town never really recovered, or so say some locals. “There’s not much to keep kids here,” admits Ben Gish, editor of the *Mountain Eagle*. Except, maybe, the music.

★
Frankfort
Whitesburg

41858

POPULATION: 1,600
LARGEST ATTENDANCE AT A LOCAL YOUTH CONCERT: 700
UNEMPLOYMENT: 10%
NEAREST MOVIE THEATER: 30 miles away
MOTTO OF THE MOUNTAIN EAGLE: It Screams!

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WHITESBURG, KENTUCKY

Tonight's square dance was organized by Appalshop, a local arts organization working to rebuild the community. It's the first for young music students who are taught by traditional musicians in the group's after-school program, Passing the Pick and Bow. Charlie Whitaker, an unflappable man with an Abe Lincoln beard and an ambling bear-like gait, calls the dance, guiding three generations of Whitesburgers. The musicians are joined by two boys on fiddle and banjo. The fiddler, Elmer Boggs, saws his way through "Shortnin' Bread" and can't wait to play more. "I know so many tunes I can't keep up with myself," he says with a grin. Sexton shows the boys the way, his fingers falling into place as easily as knitting, playing as if he could play forever.

Two nights later, in the next hollow over, a different kind of musical revival takes place. Lee Sexton's granddaughter Stacie is hanging out with half a dozen friends and the band If I Die Tonight, a punk-metal group that is playing a tender song about first love with enough force to shake the building, an old coal-truck garage with a concrete floor and plastic tarps hung over the barnboard walls as soundproofing. Eric Gibson, the singer, crams the mike virtually inside his mouth and releases the primal scream of adolescence.

Over the summer Whitesburg becomes a punk hub, with concerts drawing hordes of fans from hundreds of miles away. The attraction began in 2000, when a local band, Leery, tired of having nothing to do and nowhere to play, helped form an organization called Youth Bored and began to stage punk shows. Soon the town was invaded by musicians and concertgoers with dyed hair, body piercings, pale faces, and black clothing, setting up in the garage or in a defunct chair factory downtown.

Stacie, solid, dark, vivacious, is a DJ at WMMT, a local radio station, with a punk show known as "Ska, Punk, and Other Junk," aka SPOJ. She saw her first Youth Bored show when she was in high school in Hazard, 30 miles north. "I saw kids with blue hair, kids with a lot of piercings, and I thought, This is something I'm not going to like," she says. "But pretty



Pickin' it up, 14-year-old Donald Ratliff plays some old-time mountain music for his parents on his grandfather's banjo. Puttin' it down, Eric Gibson (below) and the band If I Die Tonight blast punk salvos in a coal-truck garage turned performance space. Their next gig? A concert run by a local arts group called Youth Bored.



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soon I realized that they were kids who had a passion for life and a passion for making changes in the world.”

The wild-looking kids turned out to be innocent: no fights, no arrests for drink or drugs at any concerts. One show offered “free vegan cake.” The songs are pro-environment, pro-youth, and, often, Christian, with titles like “Those Who Will Not Falter” and “Against the Dying of the Light.” “We write songs that come from the heart,” says Gary Bentley, the drummer of If I Die Tonight. “We’ve been called a positive youth band.”

Youth Bored concerts often attract those who don’t fit in, says Ada Smith, a fan at the garage rehearsal. “There are so many kids at school who’ll be made fun of for how they look, but they know they can come to shows and be accepted for who they are.” Ada’s taken up the electric bass and is thinking of forming “an all-girl punk band, or I might join up with three guys I know. That would be more folk punk, or thrash.

Caravans from Virginia, Tennessee, and Kentucky converge on Whitesburg for one of many concerts sponsored by Youth Bored. “A lot of kids grow up expecting to fail,” says Will Dodson, 25, who helped start Youth Bored. “Our big tasks are to illuminate their options, excite them, and not let them despair.”



“A lot of people in the community think, Those kids are not respecting the deep mountain heritage we have,” Ada says. But punk, she maintains, voices the same concerns as the mountain folk songs picked out on the banjo by her friend Stacie’s grandfather and other traditional Appalachian musicians—the hard life, the exploitation, the destruction of the environment.

Stacie herself honored the old music so much that she moved to Whitesburg from Hazard to learn from her grandfather. Now she’s toying with the idea of fitting banjo into a punk band. Ada may join her on bass. □

WEBSITE EXCLUSIVE Hear the sound of Whitesburg’s music, from traditional Appalachian to punk rock, courtesy of Appalshop and Youth Bored. Find more 41858 images along with field notes and resources at nationalgeographic.com/magazine/0405.

LEGAL NOTICE

To Purchasers Of Electric Air Compressors

This Notice is provided by Court Order. If you are a Settlement Class Member, your rights may be affected.

The Court preliminarily approved proposed settlements of a class action against Campbell Hausfeld, DeVilbiss Air Power Co., Ingersoll-Rand Co., and Coleman Powermate, Inc. In this case, Plaintiffs allege Defendants labeled air compressors that misrepresented the horsepower of the motors. Defendants deny the allegations.

The Settlement Class includes all Persons in the U.S. who purchased between August 1, 1996 and January 30, 2004, an electric air compressor manufactured, imported, licensed or distributed by any Defendant which identified on its label a horsepower that is not continuous running horsepower.

Under the proposed settlements, Persons who purchased a Campbell or DeVilbiss air compressor may be entitled to a credit towards product purchases or free products, respectively, worth up to \$50. Powermate is donating certain equipment or tools to charity. All Defendants have also agreed to stop labeling air compressors with electric motors, for use on a nominal 120-volt circuit, with peak horsepower. In exchange, Settlement Class Members' claims against the Defendants will be released and extinguished as provided in the Settlement Agreements.

Defendants sold their air compressors under many different brand names. A complete list of the

brand names can be found on the settlement website.

A hearing to determine whether the settlements should be granted final approval will be held before Judge Robert LeChien, in Courtroom 402, St. Clair County Courthouse, 10 Public Square, Belleville, Illinois 62220, at 9:30 a.m. on **July 19, 2004**.

YOU MAY BE A MEMBER OF THE SETTLEMENT CLASS. TO FIND OUT MORE, go to www.aircompressorsettlement.com, call toll-free (866) 808-3549, or write to The Garden City Group, Inc., P.O. Box 9000 #6191, Merrick, NY 11566-9000 to submit a claim, or see the other settlement documents.

You may request exclusion from the Settlement Class by submitting a written request with your name, address and phone number, your desire to be excluded from the Settlement Class, and reference: Air Compressor Litigation. It must be sent to the claims administrator and postmarked by **May 21, 2004**. If you seek to be excluded, you will not be entitled to any settlement benefits. Settlement Class Members will be bound by the settlements whether or not they file a claim.

DO NOT CONTACT THE COURT OR THE CLERK'S OFFICE.

DATED: January 30, 2004

(866) 808-3549

www.aircompressorsettlement.com

ONE THAT ALMOST GOT AWAY

Final Edit



GREAT PLAINS

Stampede!

Hunting an image that captures the comeback of the buffalo, photographer Jim Richardson went to the Triple U Buffalo Ranch in South Dakota, where he spent several cloudy days waiting for just the right light. When the sun finally broke through, he hopped in his car and headed toward the herd. Almost on cue, the herd headed for him. For a few fleeting seconds Richardson found himself driving alongside thousand-pound animals running 25 miles an hour. Steering with one hand and shooting wildly with the other, he never imagined he'd get anything worthwhile—until he saw the frame above. The bison eventually began grazing on a far hill, allowing him to make the image on pages 4-5. But the shot above was a contender. "It had energy, drama, and movement," says Richardson, "but it didn't have big numbers indicating a comeback. The other shot was more symbolic of the Great Plains, and that was the deciding factor, no matter which one I'd rather hang on my wall."

WEBSITE EXCLUSIVE

Cut it or keep it? Find out more about what tipped the balance for this photo and send it as an electronic greeting card in Final Edit at nationalgeographic.com/magazine/0405.

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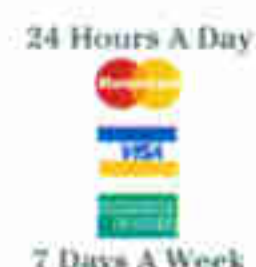
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ON ASSI

ON THE ROAD, IN THE FIELD



JOEL SARTORE (ABOVE); JIM RICHARDSON (OPPOSITE, ALL)

CUBA, KANSAS

At Home on the Range

Where small-town life goes by at shutter-speed

As a kid on his family's dairy farm outside Belleville, Kansas, **Jim Richardson** felt as if his state had been left off the cultural map of America. "Back then," he says, "looking at magazines and television, I never saw the kinds of places or people I knew."

Jim's father was a camera buff, and Jim caught the bug himself

by age 11. He grew up to roam the world as a professional photographer. But the old home state was always in his blood—and in his photography.

"Kansas has stories to tell. I wanted to make those stories real for other people."

For the past 30 years Jim's been taking pictures of Cuba, Kansas, population 231. The

town was convenient, just 15 miles from his parents' farm, and when Jim returned to see his family, he'd often swing through Cuba too. What kept him coming back was the warm welcome of the residents (and don't call them Cubans, Jim says—it's just "folks from Cuba").

Even so, when Jim (above, with Santa Joe Chizek) visited last December, he didn't expect to find a sign "like you see advertising pancake suppers" on the main street. It read: "Welcome Jim Richardson," but it didn't need to. Cuba had been doing that since 1974.

GNMENT

C O V E R I N G T H E W O R L D



Jay Beam and Brenda Fisher posed for Jim at the Hillcrest High prom (left). Jay is now Cuba's mayor; his daughter, Lynae, also goes to Hillcrest—and to its prom (right).



Diane Breeding's Lazy B Bar may have closed, but Tom Trecek (left) can still find a seat at the Two Doors Down café (right), where Diane's daughter Hannah holds her own little girl.



Steve Benyshek stood tall in Cuba as a drywall installer (left) and as the town's mayor. These days he plays piano at the annual Rock-A-Thon community fund-raiser.



HANOI

The Sounds of Change

It's his job to notice the way a place looks; **David Alan Harvey** has photographed more than 40 GEOGRAPHIC articles since 1973. But when he shot the magazine's November 1989 Hanoi story, what really struck him about the city was the way it sounded. "It was silent," he remembers. "It was all bicycle traffic or people walking, so there wasn't much on the streets to hear. To me that's the sound of a socialist city."

Things have changed in 15 years. As capitalism has grown in Hanoi, so has the decibel level. "Now it's a city full of noise," he says. "Cars, horns, motorbikes." And, since Dave's visit came during the spring monsoons, he also heard the roar of heavy rain (left).

WORLDWIDE

Randy Olson may have faced more peril shooting from this ledge on a misty morning (right) than he ever did photographing the citizens of Whitesburg, Kentucky. But strangers haven't always been welcome in this neck of the woods. In 1967 a man living in nearby Jeremiah was angered to find a group of filmmakers on his land and gunned one down. "People here are wary that outsiders might make them look like hillbillies," says Randy, whose photos of Sudan appeared in the February 2003 issue.

WEBSITE EXCLUSIVE Find more stories from our authors and photographers, including their best, worst, and quirkiest experiences, at nationalgeographic.com/magazine/0405.



HUNH BUI THI HANH (TOP); RANDY OLSON

David McLain had been assigned to photograph Bob Ballard's expeditions in the Black Sea and Mediterranean, and he knew he'd have to synchronize with Ballard's shipboard schedule. But McLain had a problem. "Ballard hardly ever sleeps, so neither could I," he says. "Things were happening

24 hours a day. I was afraid I'd miss something." On the rare occasion he did get to bed, David—the father of two young children—rediscovered something he hadn't known in a while: restful sleep. "My bunk was cozy and dark and quiet. The rocking of the ship just knocked me right out."



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For John's heartburn.

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PREVACID Delayed-Release Capsules, PREVACID SoluTab Delayed-Release Orally Disintegrating Tablets and PREVACID For Delayed-Release Oral Suspension are indicated for:

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CONTRAINDICATIONS

PREVACID is contraindicated in patients with known hypersensitivity to any component of the formulation of PREVACID.

Amoxicillin is contraindicated in patients with a known hypersensitivity to any penicillin.

Clarithromycin is contraindicated in patients with a known hypersensitivity to clarithromycin, erythromycin, and any of the macrolide antibiotics.

Concomitant administration of clarithromycin with cisapride, pimozide, astemizole, or terfenadine is contraindicated. There have been post-marketing reports of drug interactions when clarithromycin and/or erythromycin are co-administered with cisapride, pimozide, astemizole, or terfenadine resulting in cardiac arrhythmias (QT prolongation, ventricular tachycardia, ventricular fibrillation, and torsades de pointes) most likely due to inhibition of metabolism of these drugs by erythromycin and clarithromycin. Fatalities have been reported.

(Please refer to full prescribing information for amoxicillin and clarithromycin before prescribing.)

WARNINGS

CLARITHROMYCIN SHOULD NOT BE USED IN PREGNANT WOMEN EXCEPT IN CLINICAL CIRCUMSTANCES WHERE NO ALTERNATIVE THERAPY IS APPROPRIATE. IF PREGNANCY OCCURS WHILE TAKING CLARITHROMYCIN, THE PATIENT SHOULD BE APPRISED OF THE POTENTIAL HAZARD TO THE FETUS. (SEE **WARNINGS** IN PRESCRIBING INFORMATION FOR CLARITHROMYCIN.)

Pseudomembranous colitis has been reported with nearly all antibacterial agents, including clarithromycin and amoxicillin, and may range in severity from mild to life threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhea subsequent to the administration of antibacterial agents.

Treatment with antibacterial agents alters the normal flora of the colon and may permit overgrowth of clostridia. Studies indicate that a toxin produced by *Clostridium difficile* is a primary cause of "antibiotic-associated colitis."

After the diagnosis of pseudomembranous colitis has been established, therapeutic measures should be initiated. Mild cases of pseudomembranous colitis usually respond to discontinuation of the drug alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation, and treatment with an antibacterial drug clinically effective against *Clostridium difficile* colitis.

Serious and occasionally fatal hypersensitivity (anaphylactic) reactions have been reported in patients on penicillin therapy. These reactions are more apt to occur in individuals with a history of penicillin hypersensitivity and/or a history of sensitivity to multiple allergens.

There have been well-documented reports of individuals with a history of penicillin hypersensitivity reactions who have experienced severe hypersensitivity reactions when treated with a cephalosporin. Before initiating therapy with any penicillin, careful inquiry should be made concerning previous hypersensitivity reactions to penicillins, cephalosporins, and other allergens. If an allergic reaction occurs, amoxicillin should be discontinued and the appropriate therapy instituted.

SERIOUS ANAPHYLACTIC REACTIONS REQUIRE IMMEDIATE EMERGENCY TREATMENT WITH EPINEPHRINE, OXYGEN, INTRAVENOUS STEROIDS, AND AIRWAY MANAGEMENT, INCLUDING INTUBATION, SHOULD ALSO BE ADMINISTERED AS INDICATED.

PRECAUTIONS

General

Symptomatic response to therapy with lansoprazole does not preclude the presence of gastric malignancy.

Information for Patients

PREVACID is available as a capsule, orally disintegrating tablet and oral suspension, and is available in 15 mg and 30 mg strengths. Directions for use specific to the route and available methods of administration for each of these dosage forms is presented below. PREVACID should be taken before eating. PREVACID products SHOULD NOT BE CRUSHED OR CHEWED.

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Administration Options

1. PREVACID Delayed-Release Capsules

PREVACID Delayed-Release Capsules should be swallowed whole.

Alternatively, for patients who have difficulty swallowing capsules, PREVACID Delayed-Release Capsules can be opened and administered as follows:

- Open capsule.
- Sprinkle intact granules on one tablespoon of either applesauce, ENSURE® pud-

ding, cottage cheese, yogurt or strained pears.

- Swallow immediately.

PREVACID Delayed-Release Capsules may also be emptied into a small volume of either apple juice, orange juice or tomato juice and administered as follows:

- Open capsule.
- Sprinkle intact granules into a small volume of either apple juice, orange juice or tomato juice (60 mL – approximately 2 ounces).
- Mix briefly.
- Swallow immediately.
- To insure complete delivery of the dose, the glass should be rinsed with two or more volumes of juice and the contents swallowed immediately.

USE IN OTHER FOODS AND LIQUIDS HAS NOT BEEN STUDIED CLINICALLY AND IS THEREFORE NOT RECOMMENDED.

2. PREVACID SoluTab Delayed-Release Orally Disintegrating Tablets

PREVACID SoluTabs are not designed to be swallowed intact or chewed. The tablet typically disintegrates in less than 1 minute.

- Place the tablet on the tongue.
- Allow it to disintegrate with or without water until the particles can be swallowed.

3. PREVACID for Delayed-Release Oral Suspension

PREVACID for Delayed-Release Oral Suspension should be administered as follows:

- Open packet.
- To prepare a dose, empty the packet contents into a container containing 2 tablespoons of **WATER**. DO NOT USE OTHER LIQUIDS OR FOODS.
- Stir well, and drink immediately.
- If any material remains after drinking, add more water, stir, and drink immediately.
- **This product should not be given through enteral administration tubes.**

Drug Interactions

Lansoprazole is metabolized through the cytochrome P₄₅₀ system, specifically through the CYP3A and CYP2C19 isozymes. Studies have shown that lansoprazole does not have clinically significant interactions with other drugs metabolized by the cytochrome P₄₅₀ system, such as warfarin, antipyrine, indomethacin, ibuprofen, phenytoin, propranolol, prednisone, diazepam, or clarithromycin in healthy subjects. These compounds are metabolized through various cytochrome P₄₅₀ isozymes including CYP1A2, CYP2C9, CYP2C19, CYP2D6, and CYP3A. When lansoprazole was administered concomitantly with theophylline (CYP1A2, CYP3A), a minor increase (10%) in the clearance of theophylline was seen. Because of the small magnitude and the direction of the effect on theophylline clearance, this interaction is unlikely to be of clinical concern. Nonetheless, individual patients may require additional titration of their theophylline dosage when lansoprazole is started or stopped to ensure clinically effective blood levels.

In a study of healthy subjects neither the pharmacokinetics of warfarin enantiomers nor prothrombin time were affected following single or multiple 60 mg doses of lansoprazole. However, there have been reports of increased International Normalized Ratio (INR) and prothrombin time in patients receiving proton pump inhibitors, including lansoprazole, and warfarin concomitantly. Increases in INR and prothrombin time may lead to abnormal bleeding and even death. Patients treated with proton pump inhibitors and warfarin concomitantly may need to be monitored for increases in INR and prothrombin time.

Lansoprazole has also been shown to have no clinically significant interaction with amoxicillin.

In a single-dose crossover study examining lansoprazole 30 mg and omeprazole 20 mg each administered alone and concomitantly with sucralfate 1 gram, absorption of the proton pump inhibitors was delayed and their bioavailability was reduced by 17% and 16%, respectively, when administered concomitantly with sucralfate. Therefore, proton pump inhibitors should be taken at least 30 minutes prior to sucralfate. In clinical trials, antacids were administered concomitantly with PREVACID Delayed-Release Capsules; this did not interfere with its effect.

Lansoprazole causes a profound and long-lasting inhibition of gastric acid secretion; therefore, it is theoretically possible that lansoprazole may interfere with the absorption of drugs where gastric pH is an important determinant of bioavailability (e.g., ketoconazole, ampicillin esters, iron salts, digoxin).

Carcinogenesis, Mutagenesis, Impairment of Fertility

In two 24-month carcinogenicity studies, Sprague-Dawley rats were treated orally with doses of 5 to 150 mg/kg/day, about 1 to 40 times the exposure on a body surface (mg/m²) basis, of a 50-kg person of average height (1.46 m² body surface area) given the recommended human dose of 30 mg/day (22.2 mg/m²). Lansoprazole produced dose-related gastric enterochromaffin-like (ECL) cell hyperplasia and ECL cell carcinoids in both male and female rats. It also increased the incidence of intestinal metaplasia of the gastric epithelium in both sexes. In male rats, lansoprazole produced a dose-related increase of testicular interstitial cell adenomas. The incidence of these adenomas in rats receiving doses of 15 to 150 mg/kg/day (4 to 40 times the recommended human dose based on body surface area) exceeded the low background incidence (range = 1.4 to 10%) for this strain of rat. Testicular interstitial cell adenoma also occurred in 1 of 30 rats treated with 50 mg/kg/day (13 times the recommended human dose based on body surface area) in a 1-year toxicity study.

In a 24-month carcinogenicity study, CD-1 mice were treated orally with doses of 15 to 600 mg/kg/day, 2 to 80 times the recommended human dose based on body surface area. Lansoprazole produced a dose-related increased incidence of gastric ECL cell hyperplasia. It also produced an increased incidence of liver tumors (hepatocellular adenoma plus carcinoma). The tumor incidences in male mice treated with 300 and 600 mg/kg/day (40 to 80 times the recommended human dose based on body surface area) and female mice treated with 150 to 600 mg/kg/day (20 to 80 times the recommended human dose based on body surface area) exceeded the ranges of background incidences in historical controls for this strain of mice. Lansoprazole treatment produced adenoma of rete testis in male mice receiving 75 to 600 mg/kg/day (10 to 80 times the recommended human dose based on body surface area).

Lansoprazole was not genotoxic in the Ames test, the *ex vivo* rat hepatocyte unscheduled DNA synthesis (UDS) test, the *in vivo* mouse micronucleus test or the rat bone marrow cell chromosomal aberration test. It was positive in *in vitro* human lymphocyte chromosomal aberration assays.

Lansoprazole at oral doses up to 150 mg/kg/day (40 times the recommended human dose based on body surface area) was found to have no effect on fertility and reproductive performance of male and female rats.

Pregnancy: Teratogenic Effects.

Pregnancy Category B

Lansoprazole

Teratology studies have been performed in pregnant rats at oral doses up to

150 mg/kg/day (40 times the recommended human dose based on body surface area) and pregnant rabbits at oral doses up to 30 mg/kg/day (16 times the recommended human dose based on body surface area) and have revealed no evidence of impaired fertility or harm to the fetus due to lansoprazole.

There are, however, no adequate or well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

Pregnancy Category C

Clarithromycin

See **WARNINGS** (above) and full prescribing information for clarithromycin before using in pregnant women.

Nursing Mothers

Lansoprazole or its metabolites are excreted in the milk of rats. It is not known whether lansoprazole is excreted in human milk. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from lansoprazole, and because of the potential for tumorigenicity shown for lansoprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother.

Pediatric Use

The safety and effectiveness of PREVACID have been established in the age group 1 year to 11 years for short-term treatment of symptomatic GERD and erosive esophagitis. Safety and effectiveness have not been established in patients < 1 year or 12-17 years of age.

Use of PREVACID in the age group 1 year to 11 years is supported by evidence from adequate and well controlled studies of PREVACID in adults with additional clinical, pharmacokinetic, pharmacodynamic, and safety studies performed in pediatric patients.

The pediatric safety of PREVACID Delayed-Release Capsules has been assessed in 66 pediatric patients aged 1 to 11 years of age. Of the 66 patients with GERD 85% (56/66) took lansoprazole for 8 weeks and 15% (10/66) took it for 12 weeks.

The adverse event profile in these pediatric patients resembled that of adults taking lansoprazole. The most frequently reported (2 or more patients) treatment-related adverse events in patients 1 to 11 years of age (N=66) were constipation (5%) and headache (3%). There were no adverse events reported in this U.S. clinical study that were not previously observed in adults.

Use in Women

Over 4,000 women were treated with lansoprazole. Ulcer healing rates in females were similar to those in males. The incidence rates of adverse events were also similar to those seen in males.

Use in Geriatric Patients

Ulcer healing rates in elderly patients are similar to those in a younger age group. The incidence rates of adverse events and laboratory test abnormalities are also similar to those seen in younger patients. For elderly patients, dosage and administration of lansoprazole need not be altered for a particular indication.

ADVERSE REACTIONS

Clinical

Worldwide, over 10,000 patients have been treated with lansoprazole in Phase 2-3 clinical trials involving various dosages and durations of treatment. The adverse reaction profiles for PREVACID Delayed-Release Capsules and PREVACID for Delayed-Release Oral Suspension are similar. In general, lansoprazole treatment has been well-tolerated in both short-term and long-term trials.

The following adverse events were reported by the treating physician to have a possible or probable relationship to drug in 1% or more of PREVACID-treated patients and occurred at a greater rate in PREVACID-treated patients than placebo-treated patients:

Incidence of Possibly or Probably Treatment-Related Adverse Events in Short-Term, Placebo-Controlled Studies		
Body System/Adverse Event	PREVACID (N= 2768) %	Placebo (N= 1023) %
Body as a Whole		
Abdominal Pain	2.1	1.2
Digestive System		
Constipation	1.0	0.4
Diarrhea	3.8	2.3
Nausea	1.3	1.2

Headache was also seen at greater than 1% incidence but was more common on placebo. The incidence of diarrhea was similar between patients who received placebo and patients who received lansoprazole 15 mg and 30 mg, but higher in the patients who received lansoprazole 60 mg (2.9%, 1.4%, 4.2%, and 7.4%, respectively).

The most commonly reported possibly or probably treatment-related adverse event during maintenance therapy was diarrhea.

In the risk reduction study of PREVACID for NSAID-associated gastric ulcers, the incidence of diarrhea for patients treated with PREVACID was 5%, misoprostol 22%, and placebo 3%.

Additional adverse experiences occurring in <1% of patients or subjects in domestic trials are shown below. Refer to **Postmarketing** for adverse reactions occurring since the drug was marketed.

Body as a Whole – abdomen enlarged, allergic reaction, asthenia, back pain, candidiasis, carcinoma, chest pain (not otherwise specified), chills, edema, fever, flu syndrome, halitosis, infection (not otherwise specified), malaise, neck pain, neck rigidity, pain, pelvic pain; *Cardiovascular System* - angina, arrhythmia, bradycardia, cerebrovascular accident/cerebral infarction, hypertension/hypotension, migraine, myocardial infarction, palpitations, shock (circulatory failure), syncope, tachycardia, vasodilation; *Digestive System* – abnormal stools, anorexia, bezoar, cardiospasm, cholelithiasis, colitis, dry mouth, dyspepsia, dysphagia, enteritis, eructation, esophageal stenosis, esophageal ulcer, esophagitis, fecal discoloration, flatulence, gastric nodules/fundic gland polyps, gastritis, gastroenteritis, gastrointestinal anomaly, gastrointestinal disorder, gastrointestinal hemorrhage, glossitis, gum hemorrhage, hematemesis, increased appetite, increased salivation, melena, mouth ulceration, nausea and vomiting, nausea and vomiting and diarrhea, oral moniliasis, rectal disorder, rectal hemorrhage, stomatitis, tenesmus, thirst, tongue disorder, ulcerative colitis, ulcerative stomatitis; *Endocrine System* - diabetes mellitus, goiter, hypothyroidism; *Hemic and Lymphatic System* - anemia, hemolysis, lymphadenopathy; *Metabolic and Nutritional Disorders* - gout, dehydration, hyperglycemia/hypo-

glycemia, peripheral edema, weight gain/loss; *Musculoskeletal System* - arthralgia, arthritis, bone disorder, joint disorder, leg cramps, musculoskeletal pain, myalgia, myasthenia, synovitis; *Nervous System* – abnormal dreams, agitation, amnesia, anxiety, apathy, confusion, convulsion, depersonalization, depression, diplopia, dizziness, emotional lability, hallucinations, hemiplegia, hostility aggravated, hyperkinesia, hypertonia, hypesthesia, insomnia, libido decreased/increased, nervousness, neurosis, paresthesia, sleep disorder, somnolence, thinking abnormality, tremor, vertigo; *Respiratory System* - asthma, bronchitis, cough increased, dyspnea, epistaxis, hemoptysis, hiccup, laryngeal neoplasia, pharyngitis, pleural disorder, pneumonia, respiratory disorder, upper respiratory inflammation/infection, rhinitis, sinusitis, stridor; *Skin and Appendages* - acne, alopecia, contact dermatitis, dry skin, fixed eruption, hair disorder, maculopapular rash, nail disorder, pruritus, rash, skin carcinoma, skin disorder, sweating, urticaria; *Special Senses* – abnormal vision, blurred vision, conjunctivitis, deafness, dry eyes, ear disorder, eye pain, otitis media, parosmia, photophobia, retinal degeneration, taste loss, taste perversion, tinnitus, visual field defect; *Urogenital System* - abnormal menses, breast enlargement, breast pain, breast tenderness, dysmenorrhea, dysuria, gynecomastia, impotence, kidney calculus, kidney pain, leukorrhea, menorrhagia, menstrual disorder, penis disorder, polyuria, testis disorder, urethral pain, urinary frequency, urinary tract infection, urinary urgency, urination impaired, vaginitis.

Postmarketing

On-going Safety Surveillance: Additional adverse experiences have been reported since lansoprazole has been marketed. The majority of these cases are foreign-sourced and a relationship to lansoprazole has not been established. Because these events were reported voluntarily from a population of unknown size, estimates of frequency cannot be made. These events are listed below by COSTART body system.

Body as a Whole - anaphylactoid-like reaction; *Digestive System* - hepatotoxicity, pancreatitis, vomiting; *Hemic and Lymphatic System* - agranulocytosis, aplastic anemia, hemolytic anemia, leukopenia, neutropenia, pancytopenia, thrombocytopenia, and thrombotic thrombocytopenic purpura; *Skin and Appendages* – severe dermatologic reactions including erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis (some fatal); *Special Senses* - speech disorder; *Urogenital System* - urinary retention.

Combination Therapy with Amoxicillin and Clarithromycin

In clinical trials using combination therapy with PREVACID plus amoxicillin and clarithromycin, and PREVACID plus amoxicillin, no adverse reactions peculiar to these drug combinations were observed. Adverse reactions that have occurred have been limited to those that had been previously reported with PREVACID, amoxicillin, or clarithromycin.

Triple Therapy: PREVACID/amoxicillin/clarithromycin

The most frequently reported adverse events for patients who received triple therapy for 14 days were diarrhea (7%), headache (6%), and taste perversion (5%). There were no statistically significant differences in the frequency of reported adverse events between the 10- and 14-day triple therapy regimens. No treatment-emergent adverse events were observed at significantly higher rates with triple therapy than with any dual therapy regimen.

Dual Therapy: PREVACID/amoxicillin

The most frequently reported adverse events for patients who received PREVACID t.i.d. plus amoxicillin t.i.d. dual therapy were diarrhea (8%) and headache (7%). No treatment-emergent adverse events were observed at significantly higher rates with PREVACID t.i.d. plus amoxicillin t.i.d. dual therapy than with PREVACID alone.

For more information on adverse reactions with amoxicillin or clarithromycin, refer to their package inserts, **ADVERSE REACTIONS** sections.

Laboratory Values

The following changes in laboratory parameters for lansoprazole were reported as adverse events:

Abnormal liver function tests, increased SGOT (AST), increased SGPT (ALT), increased creatinine, increased alkaline phosphatase, increased globulins, increased GGTP, increased/decreased/abnormal WBC, abnormal AG ratio, abnormal RBC, bilirubinemia, eosinophilia, hyperlipemia, increased/decreased electrolytes, increased/decreased cholesterol, increased glucocorticoids, increased LDH, increased/decreased/abnormal platelets, and increased gastrin levels. Urine abnormalities such as albuminuria, glycosuria, and hematuria were also reported. Additional isolated laboratory abnormalities were reported.

In the placebo controlled studies, when SGOT (AST) and SGPT (ALT) were evaluated, 0.4% (4/978) placebo patients and 0.4% (11/2677) lansoprazole patients had enzyme elevations greater than three times the upper limit of normal range at the final treatment visit. None of these lansoprazole patients reported jaundice at any time during the study.

In clinical trials using combination therapy with PREVACID plus amoxicillin and clarithromycin, and PREVACID plus amoxicillin, no increased laboratory abnormalities particular to these drug combinations were observed.

For more information on laboratory value changes with amoxicillin or clarithromycin, refer to their package inserts, **ADVERSE REACTIONS** section.

OVERDOSAGE

Oral doses up to 5000 mg/kg in rats (approximately 1300 times the recommended human dose based on body surface area) and mice (about 675.7 times the recommended human dose based on body surface area) did not produce deaths or any clinical signs.

Lansoprazole is not removed from the circulation by hemodialysis. In one reported case of overdose, the patient consumed 600 mg of lansoprazole with no adverse reaction.

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FROM OUR ARCHIVES

Flashback



IFF FROM THREE LIONS

EUROPE

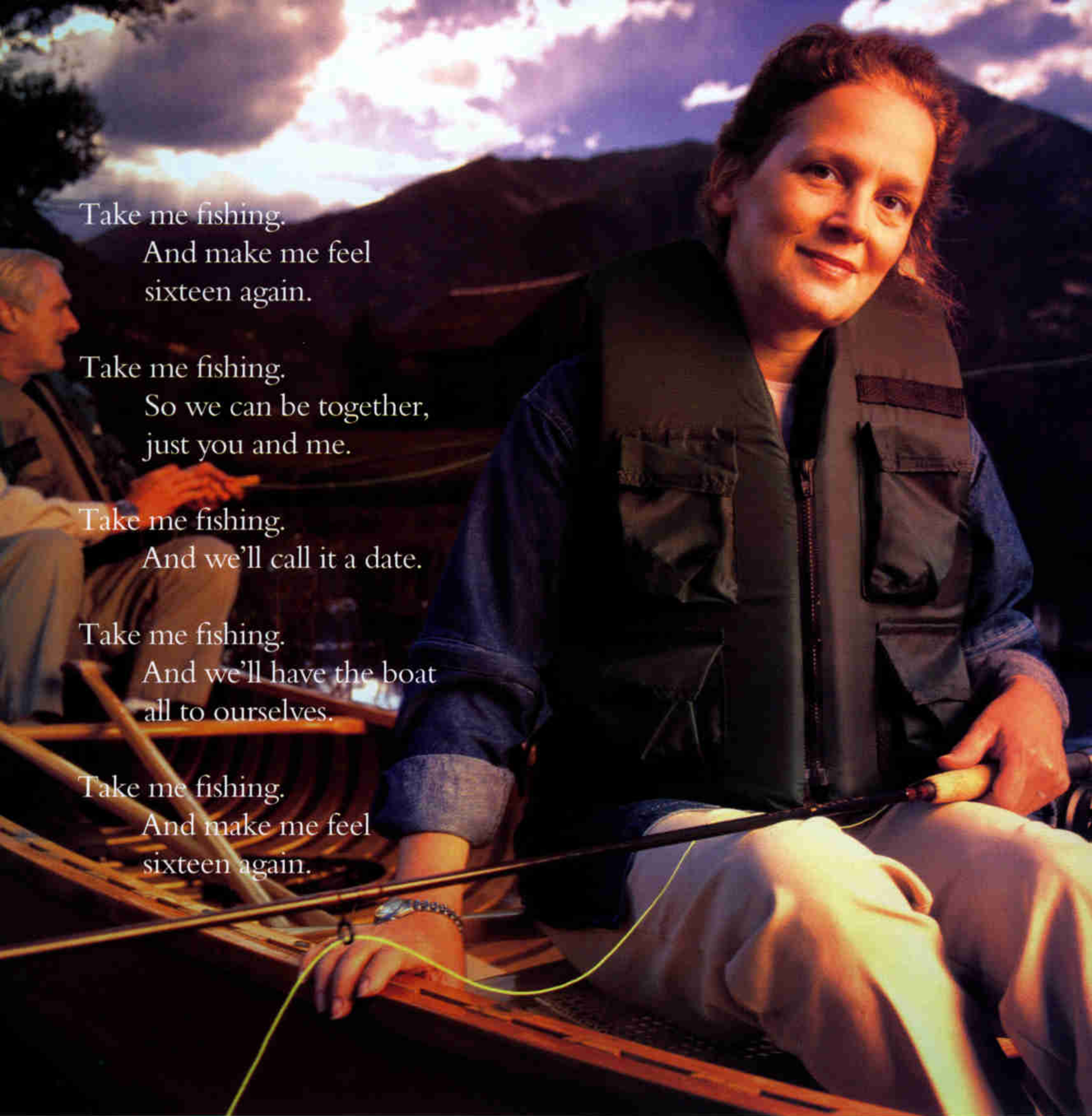
Warsaw in Winter

A portrait photographer waits for clients in downtown Warsaw in 1947. He may have waited a while. Adolf Hitler had ordered the city destroyed after the 1944 Warsaw Uprising—a revolt against occupying Nazi forces led by the Polish underground a year after the uprising by Jews in the Warsaw ghetto. The city was eventually rebuilt after Germany's defeat, and Poland's economy was gradually rebuilt too, especially after the collapse of the Soviet bloc. This month, the nation becomes a member of the European Union.

—Margaret G. Zackowitz

WEBSITE EXCLUSIVE

You can access the Flashback photo archives and send electronic greeting cards at nationalgeographic.com/magazine/0405.

A woman with reddish-brown hair, wearing a dark fishing vest over a blue long-sleeved shirt and light-colored pants, is sitting in a wooden boat. She is holding a fishing rod with a yellow line. In the background, a man with grey hair is also in the boat, looking towards the left. The scene is set against a backdrop of mountains and a dramatic, cloudy sky at sunset or sunrise, with warm orange and purple light.

Take me fishing.
And make me feel
sixteen again.

Take me fishing.
So we can be together,
just you and me.

Take me fishing.
And we'll call it a date.

Take me fishing.
And we'll have the boat
all to ourselves.

Take me fishing.
And make me feel
sixteen again.

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*"Three car payments.
Three private colleges.
Three weddings.*

I think I am having chest pains.

*How are we going
to pay for all this?*

Invest?

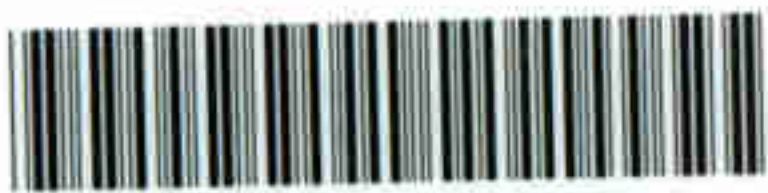
Invest in what?

*The market is
more unpredictable
than our
daughters."*



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Avalon XLS shown with available power moonroof and Premium Luxury Package. ©2003 Toyota Motor Sales, U.S.A., Inc.